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National Environmental Research Center, Research Triangle Park, N C
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LIMITED SO_2 AND NO_X MEASUREMENTS IN ST. LOUIS, 1974:
VOLUME I - PLUME TRACKING BY CORRELATION SPECTROSCOPY

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A Barringer COSPEC spectrophotometer was used to measure the total overhead burden of SO_2 and NO_{x2} in the St. Louis urban plume and in the plumes of specific power plants in the St. Louis area. This information was combined with meteorological data to calculate SO_2 fluxes in the plumes. A flame photometric sulfur monitor was used to determine ground level SO_2 concentrations at points of plume touchdown. The data is presented in detailed maps and also in tabular form.

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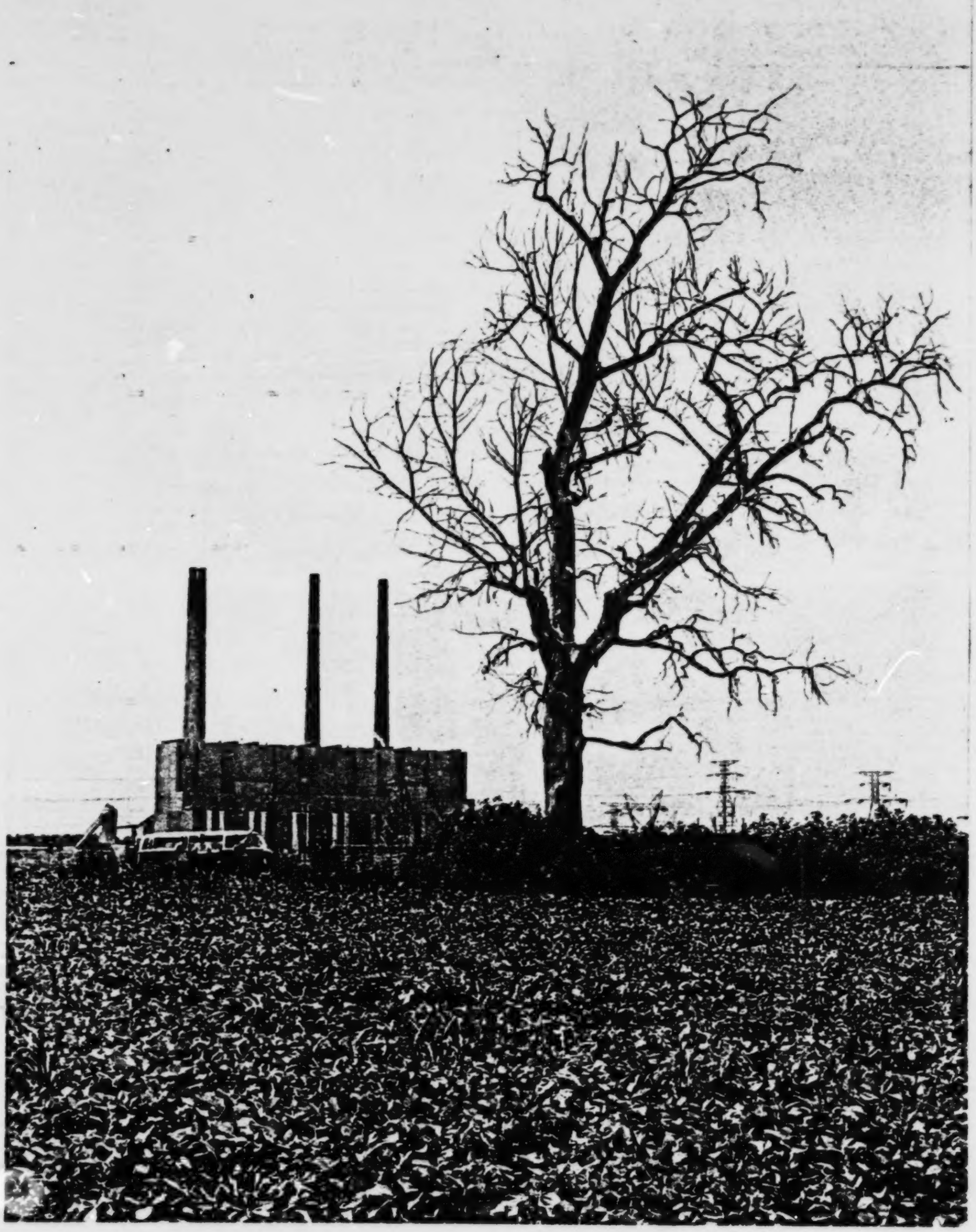

EMI Air Quality Moving Laboratory
monitors plume at Labadie Power Plant

Section 1

INTRODUCTION

PURPOSE

Environmental Measurements, Inc. (EMI) responded to a request by the Field Methods Development Section of the U.S. Environmental Protection Agency (EPA) for demonstration of remote sensing and moving measurement methodologies developed by EMI. The requested program was in part a continuation of an investigation carried out in the summer of 1973 for EPA in comparing point and path monitors. The total effort, conducted under Contract No. 68-02-1851 during the summer and fall of 1974, included three tasks; this report covers the work during Task I: Plume Tracking.

At the request of the EPA, EMI performed measurements in the St. Louis area while other contractors were conducting experiments in the Regional Air Pollution Study (RAPS). The field activities were coordinated with EPA and contractor personnel to ensure the optimum utility of the data. Furthermore, close in-the-field observation of the EMI Air Quality Moving Laboratory by the EPA project officer was encouraged to help communicate the maximum amount of information about EMI's field measurements methodology.

SUMMARY

EMI was active in the field making moving measurements from 29 July through 3 August 1974. Six data-days (4-9 hours) of reportable data gathered during a 7-14-hour day) were completed by the three-man field crew. The work was divided between urban plume studies--large-scale regional pollution mapping--and plume studies at the Labadie Power Plant. Weather conditions were generally favorable for four days,permitting good definition of the Labadie and Portage des Sioux Power Plant plumes; limited urban plume data were gathered. For two days there were less favorable conditions although potentially useful data have been reported.

The strip chart records have been processed and analyzed. Flux Maps have been plotted showing the distribution of gases downwind from St. Louis sources (Section 4, Results). Sulfur dioxide emission rates for these sources have been computed for various downwind cross sections and some analysis has been made of plume geometry (Section 5, Analysis). Appendix A contains complete listings of raw data converted to engineering units for utilization by the EPA and its contractors.

CONCLUSIONS

A correlation spectrometer, placed in a moving ground-based instrument platform can be used to locate SO_2 plumes and trace them downwind. When the remote sensor is used in conjunction with point sampling air quality sensors, the moving measurement methodology becomes a unique way of studying plume behavior, particularly the emissions/surface interaction. The data in this report show both spatial and temporal SO_2 variations; they lend themselves to mapping and present the geographical distribution of SO_2 emanating from single sources as well as the St. Louis urban area as a whole. Emission rates, plume width, and ground-level influence can be read directly from the mapped data. These results can be used to test plume models, calculate SO_2 mass flux before and after plume touchdown, and determine the radius of influence of important SO_2 sources.

Section 2

FIELD MEASUREMENTS

EQUIPMENT

Environmental Measurements, Inc. provided an Air Quality Moving Laboratory (AQML) equipped to measure overhead and ground-level SO_2. The AQML (Figure 1) was equipped with a Barringer Research Ltd. Correlation Spectrometer (COSPEC) remote sensor and a Bendix flame photometric total sulfur monitor. A teflon sampling manifold gathered air into the van by means of a squirrel cage fan; a short teflon inlet tube, in turn, sampled this air stream for analysis by the Bendix monitor. The analog signals were recorded on a Rikadenki strip chart recorder in the AQML. A rear-mounted gasoline-powered generator supplied electrical power for all instrumentation.

The COSPEC viewed the sky through a side window in the van, using a right angle mirror to reflect overhead light. The natural radiation of the solar electromagnetic spectrum is influenced by the absorption spectrum of the target gas, sulfur dioxide; (nitrogen dioxide was measured simultaneously and data on this gas were also recorded but not analyzed). The Correlation Spectrometer, an electro-optical instrument, detects portions of the molecular absorption bands specific for these molecules. The optical unit includes a Cassegrain

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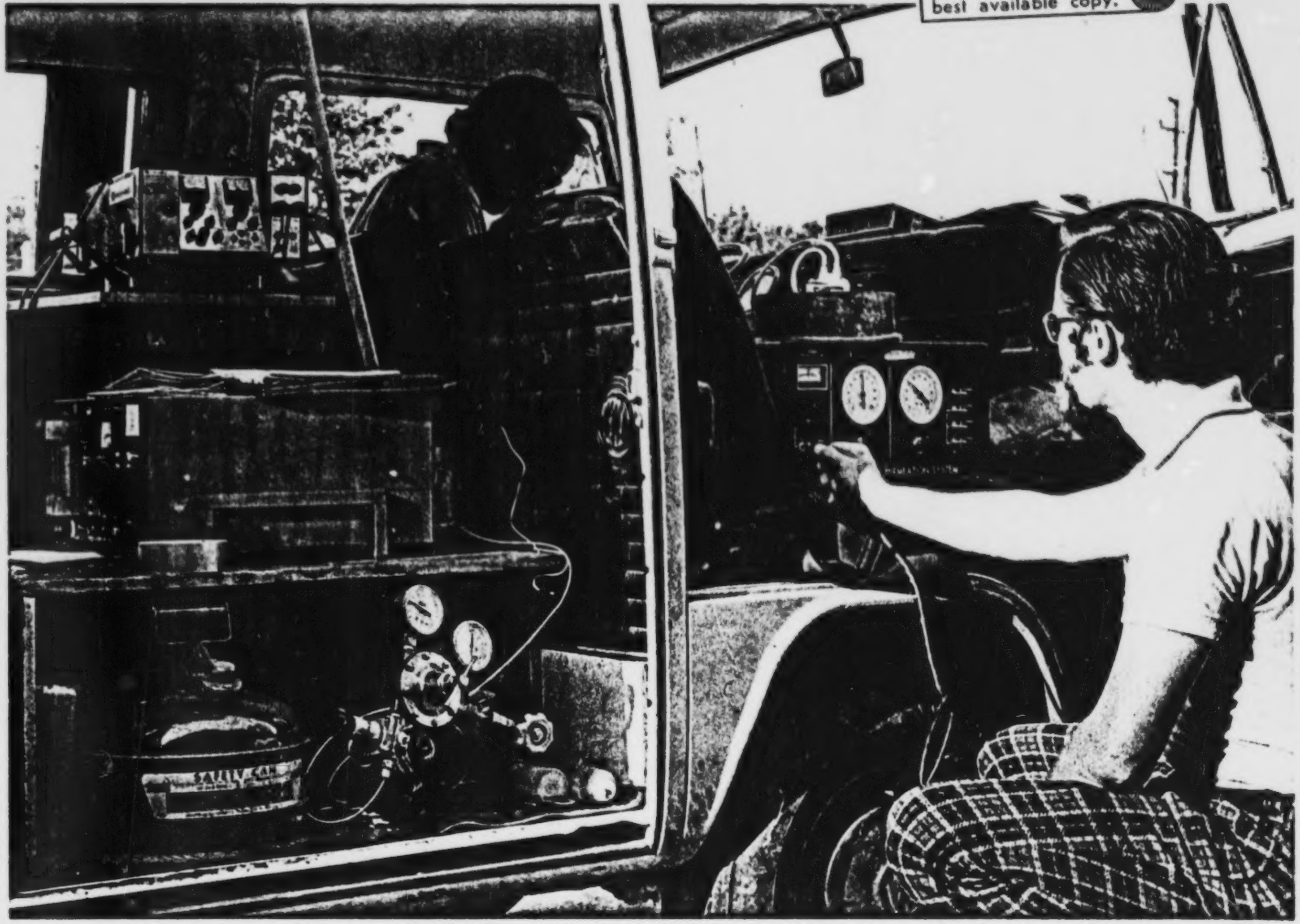


Figure 1. EMI Air Quality Moving Laboratory during morning calibration; COSPEC upper left, Bendix analyzer below and permeation system at right.

Table I

BARRINGER RESEARCH COSPEC III
DUAL-GAS CORRELATION SPECTROMETER
Specifications

TARGET GASES:	SO_2 and NO_2	
LIGHT SOURCES:	Skylight	
OPTICS:	Cassegrain telescope on front turret 1° x 1°. A right-angle mirror attachment is provided for "vertical look" operation. A sighting telescope is provided for alignment on the light source or a target plume.	
DYNAMIC RANGE:	1-1000 ppm-M (parts per million-meter)	
SENSITIVITY:	2 ppm-M (threshold at 8 second integration time)	
RESPONSE TIME:	1,2,4,8,16, or 32 seconds	
OUTPUTS:	SO_2 Signal NO_2 Signal SO_2 AGC Voltage NO_2 AGC Voltage	Each is 0-10 VDC at 10K Ohm source impedance, compatible with 0-1 ma strip chart recorder.
CALIBRATION:	Four fused-silica cells; two each for SO_2 and NO_2	
CONTROLS:	Power, ON/OFF: Signal alignment Meter scale change; Zero offset adjust; Integration time	Entrance slit translation contol; Calibration cell selectors.
MECHANICAL:	Size: 28" x 12" x 17" (71 cm x 30 cm x 43 cm) Weight: 38 lbs (17.2 kg) including isolators and mounting plate (provided with standard tripod mounting holes)	
ENVIRONMENTAL:	Vibration isolators are standard Ambient temperature range: -20°C to +50°C	
POWER REQUIREMENTS:	115 VAC, 60 hz, 18 watts	

telescope, and Ebert-Fastie quarter-meter dispersive element, a correlation disc assembly, and a photomultiplier to detect light energy levels. The electronics of the COSPEC contain signal processing circuits to provide an analog output suitable for strip chart recorders. Specifications for the COSPEC III (Serial No. 6061) used in this study appear in Table I.

Calibration for the COSPEC was carried out on a frequent and routine basis (approximately once an hour in the field). The calibration was performed by placing gas-filled quartz cells into the light path. These cells contain fixed amounts of SO_2 (or NO_2) in a dry nitrogen atmosphere. They were rotated into the optical path providing span offsets for three different concentration-path length conditions, 87 ppmM SO_2, 418 ppmM SO_2 and 505 ppmM SO_2, in the background atmosphere away from plumes prior to or just after a traverse. Notations of the time and the cells used during the calibration were made on the chart record. The voltage for the automatic gain control (AGC) circuit was also noted on the chart record to provide an indication of the changing light intensity during the day.

From the 53 COSPEC calibrations made over six days the average sensitivity was calculated for each day. The standard deviation of these six averages (as a percent of the mean) is 4.9%. Therefore, a single sensitivity (0.755 ppmM/mv) was used for all six days. This factor was applied to the linear portion of the COSPEC response, 0-500 ppmM; beyond 500 ppmM, instrument non-linearity was corrected before making flux calculations.

The Bendix Corporation Model 8300 Flame Photometric Total Sulfur Monitor was calibrated with the Bendix permeation system containing permeation tube No. NBS 1627-18-13. The instrument was calibrated at the end of each field day and on four of the mornings before field work was initiated. The calibration before and after the week of field work was within 5% of the anticipated permeation rate, indicating a stable system during the course of the field work. Specifications for the Bendix analyzer (Serial No. 30347) used in this study appear in Table II.

ACTIVITIES

EMI carried out six data-days of moving measurements using an Air Quality Moving Laboratory in St. Louis and environs. A data-day consisted of 7-14 activity hours for the field crew; 4-9 hours of reportable data were gathered at the assigned target or at some task-related target of opportunity which was located during the measurement day. Normal remote sensor measurement hours, which are dependent on daylight for instrument operation in the passive mode, were approximately 0900-1600 CDT. However, data were collected as early as 0730 and as late as 1845 CDT.

The three-person field crew logged a total of 63 activity hours during the 29 July through 3 August 1974 study

Table II

BENDIX CORPORATION MODEL 8300
FLAME PHOTOMETRIC TOTAL SULFUR ANALYZER
Specifications

TARGET GASES:	Sulfur compounds in air
DETECTION PRINCIPLE:	Flame photometry
RANGE:	0-1 ppm
SENSITIVITY:	5 ppb
RESPONSE TIME:	30 seconds for 90% of fullscale
ACCURACY:	±2% of fullscale
OUTPUTS:	0-10 mv and 0-1 v
CALIBRATION:	Permeation system
CONTROLS:	Power and pump switches Zero and span adjust By-pass switch H_2 and sample meters and valves
MECHANICAL:	16.5" x 8.5" x 18" (42 cm x 22cm x 46 cm) Weight: 60 lbs (27.2 kg)
ENVIRONMENTAL:	Ambient temperature range: 0°C to 40°C
POWER REQUIREMENTS:	105-125 VAC, 50 or 60 H_z, 300 watts

period. Moving measurements were made during 41 of these hours; stationary measurements (instruments active but AQML temporarily parked) were made for an additional five hours. A total of 2210 km was covered by the AQML or an average of 370 km driven each day. Targets of each day's field activities were defined the previous evening (1900 CDT) at a meteorological briefing at the RAPS central office. In this way optimum use was made of meteorological projections to define the most useful set of measurements while assuring that complementary projects would be coordinated in the field. With forecasts of stable winds the urban plume was to be tracked down-wind to extinction; when winds were more variable the Labadie Power Plant was to be monitored. In both cases, the coordination with and cooperation of other contractors, principally the Meteorological Research Inc. (MRI) instrumented aircraft, was sought to assure the maximum amount of simultaneously-gathered data.

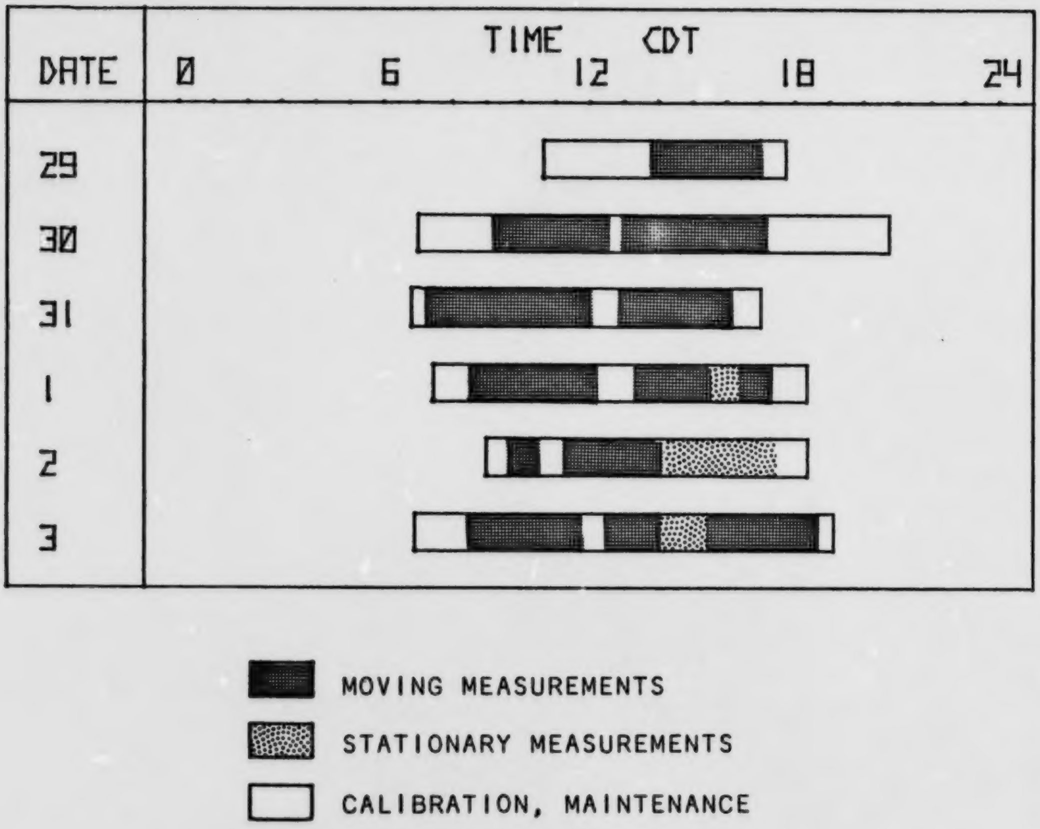
Figure 2 summarizes the field activities. A brief summary of each day's activities follows:

29 July 1974: The AQML was taken to the Labadie Power Plant west of St. Louis. The plume was encountered on nearby roads and was measured 12 times, at distances ranging from 0.5 to 10 kilometers downwind. No plume touchdown was detected.

Figure 2

Activity Summary

July-August 1974



30 July 1974: This day was designated for the measurement of the urban plume. The AQML made an initial traverse from north to south in Illinois detecting a variety of source-related plumes. By midday the wind became stronger and gustier, and measurements further east into Illinois failed to detect the transport of SO_2 in measurable quantities. (The MRI aircraft observed the urban plume at two different radii on this day as well.)

31 July 1974: The Labadie plume was first detected north of the Missouri River about 0900 CDT. During the following hour winds stabilized and the plume was measured south of the river due-east of the power plant. A total of 15 plume cross sections were made throughout the remainder of the day, with the first ground-level measurements indicating inversion breakup and plume touchdown occuring about noon. (The MRI aircraft made early morning plume observations on this day).

1 August 1974: The Labadie plume was first measured shortly after 0800 CDT and was cross-sectioned a total of seven times before midday. These runs were particularly well coorinated with the MRI aircraft measurements of the Labadie plume during the early morning. In the afternoon the wind became light and variable; overhead and ground-level SO_2 were detected on both sides of the Missouri River.

2 August 1974: Two high speed urban plume traverses were made north of St. Louis. While the AQML was stationary in the urban area an overhead plume--which also touched down--was detected.

3 August 1974: Consistent winds of relatively high velocity provided the most ideal measurement day; measurements of both the urban plume and industrial plumes were made up to 70 kilometers east of the Arch. The Portage des Sioux plume was recorded a total of 7 times; other power plant and industrial plumes were measured also. Both overhead SO_2 and ground-level SO_2 were detected for the greatest downwind distances of any day. The MRI aircraft made measurements at two different radii in coordination with EMI's movements.

METHODOLOGY

The methods used for obtaining moving measurements of air quality for RAPS have been developed by EMI in other extensive field projects. Depending on the specific target for observation--either the Labadie or the St. Louis Urban Plume--the specific nature of the data may have changed but the approach to gathering the data was the same. The goal of each field day was to complete as many downwind traverses as possible of either plume to provide the necessary data to characterize it. Because of the smaller dimensions of the power plant plume, it was easier to make more traverses under or through it on a given day. In general, an attempt was made to gather four traverses of the power plant plume at each radius from the plant; the broader urban plume was traversed twice at each distance. This approach provides sufficient data to compute useful plume parameters, such as flux and σy with greater confidence than is possible from only one crossing.

Geographic Labeling. The use of the moving laboratory to gather air quality data requires that many measurements be related to the geographic location where the observations are made. Prior to the actual field work a set of county highway maps was annotated with numerical identifications of key features such as streams and road intersections. While traveling down a road and using these maps, the identification numbers are recorded on the chart record to locate where the value for total burden of SO_2 and ground-level sulfur concentrations were recorded. By labeling the most likely routes for traversing in advance, a systematic identification system was used for the entire study. Few additional routes had to be labeled in the field. These geographic labels were then associated with the Universal Transverse Mercator coordinate system for Zone 15.

Traversing. On days when the forecast called for variable winds during the day, the target selected for observation was the Labadie Power Plant. Upon arrival near the power plant preliminary traverses were made to confirm the overhead location of the plume. A set of about four plume crossings was made at one radius from the power plant. As soon as this set of measurements was completed the AQML was moved to a different radius--closer or farther from the plant--for another set of plume crossings. This process continued until the maximum number of plume crossings was obtained at as many different traversing radii as possible. Both the overhead total burden SO_2 (and NO_2) and the ground-level sulfur concentrations were monitored on each traverse.

Typically the moving laboratory was traversed back and forth at increasing radii from the source. By so doing it was able to map the dispersal pattern directly from the power plant downwind to where the pollution was detectable on the ground. Such moving measurements define not only the horizontal instability of the atmosphere (by the measured plume width) but also the plume molecular density which indicates the molecular flux and source emission rate into the prevailing wind.

An important consideration in mobile measuring is the speed of the moving laboratory. Close to the power plant speed is kept low (below 10 M/S) to allow the instruments to respond fully and to provide clear definition of narrow plumes. As the AQML moves further downwind from the plant it moves faster through the plume. The speed of the vehicle increases to a maximum of 25-30 M/S at the farthest radius. This increase in speed permits the field crew to travel under the plume in the shortest possible time to map its dispersal pattern. Because the plume is broader at the greater distances, changes in overhead burdens and ground-level concentrations are less abrupt, and the instruments can respond to them easily. Adjusting the vehicle speed results in the moving laboratory obtaining a "snapshot" of the plume at a number of downwind distances.

For the urban plumes, the same methodology was used. Due to the greater distances required to traverse the plume, less time was available to make several traverses and still move farther downwind. Hence only one or two traverses at each radius were possible.

Field Crew. A three person field crew, a driver, a navigator and a data-logger, operated the EMI Moving Laboratory. The data-logger entered onto the strip chart record the locations, times and points of instrument zero and span calibration. The location references were read by the navigator from previously numbered maps and were entered on the data record to facilitate geographical orientation of the mobile data.

The data logger and navigator controlled the route followed by the moving laboratory. Decisions were made in the field based on the real-time data, on whether to repeat the plume-tracking measurement at the present radius or to move to a second radius of measurement.

A transceiver was used intermittantly to communicate with the MRI aircraft. Radio contact was achieved while the AQML was moving and when stopped for calibration (Figure 3). This real-time communication between the AQML and the instrumented aircraft insured close coordination between the two mobile units. As a result, data gathered simultaneously by the AQML on a road and by the aircraft flying above the same road may provide new information on plume behavior.

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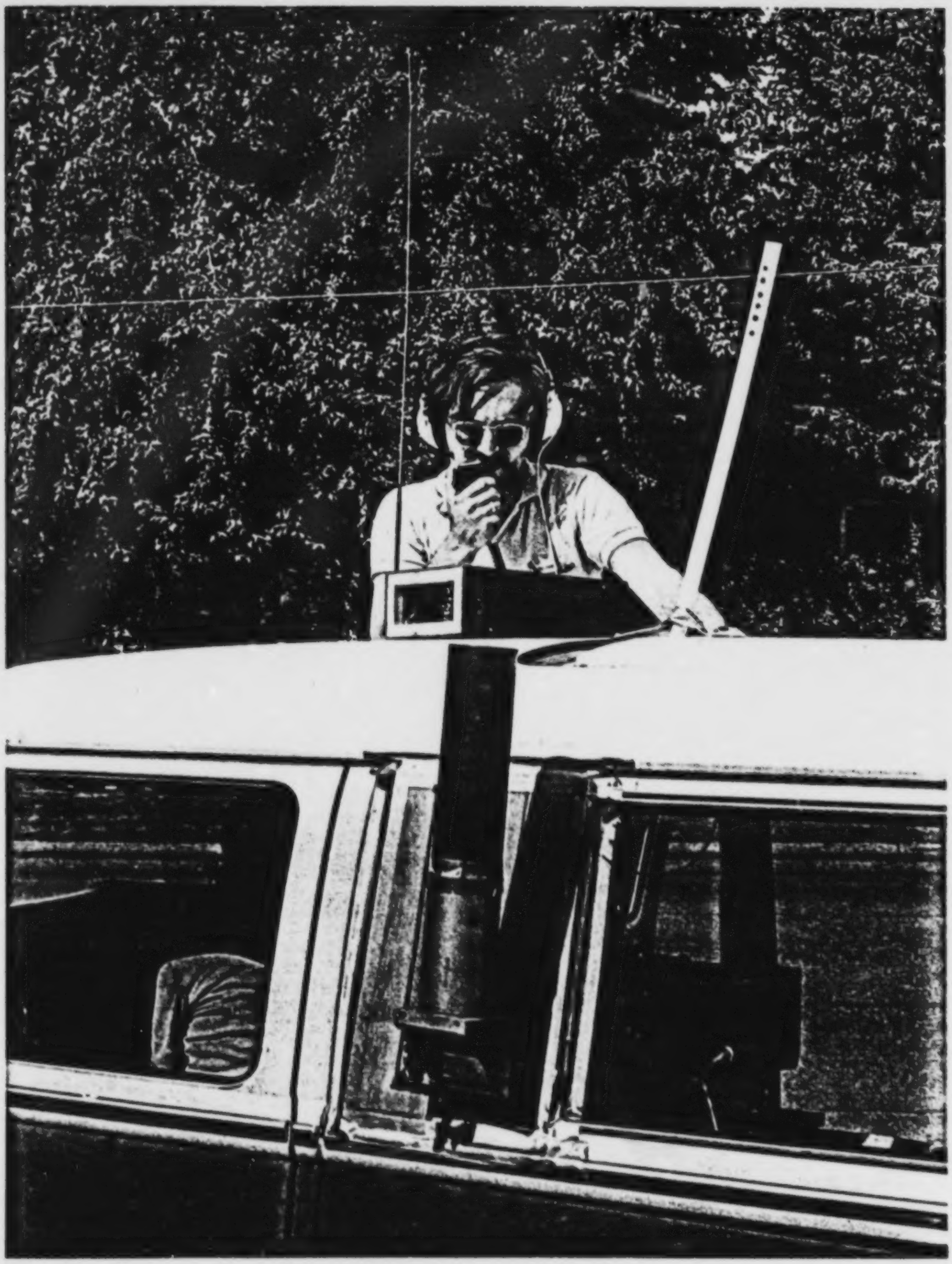


Figure 3. Transceiver provides real-time communication between AQML and aircraft.

Unfortunately equipment problems prevented continuous radio communication of this kind, severely limiting the times when coordinated data gathering could occur. However, the technique proved to be valuable and should be employed on future projects.

Section 3

DATA PROCESSING

The field data collected in St. Louis were taken to the EMI office in San Francisco for processing. The large amount of moving data collected by the AQML require careful and systematic manipulation to relate the analog signals from the air quality sensors to the geography and meteorology of the study site; the results from this procedure are computer calculations of source emission rates and computer plotted maps of emissions downwind of the sources.

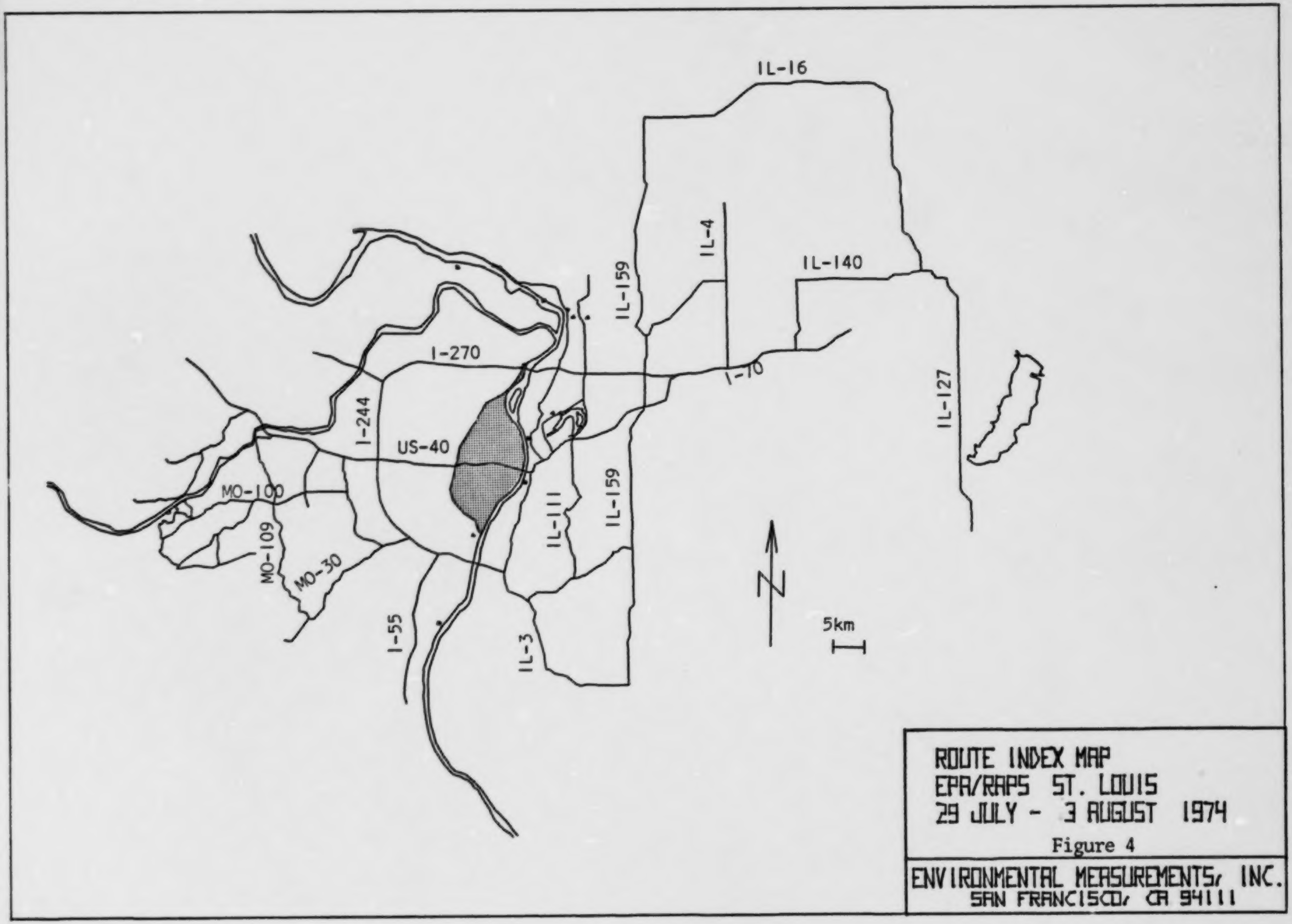
DIGITIZATION

In its raw state, the moving laboratory data are in the form of strip chart records containing analog traces for SO_2 Total Burden (SO_2 TB) and SO_2 Ground Level (SO_2 GL). (NO_2 Total Burden is a part of the record also but was not processed for this report.) These records also include annotations of time and positions made by the data-logger during the traverses. At appropriate intervals, instrument calibrations, sensitivities and zero checks, probable sources of measured plumes and weather conditions are written on the chart.

To facilitate the manipulation of all of these variables, the first major operation is to convert the data traces (and geography and time entries) into digits which a computer can assimilate. Using a combination of machine and hand digitization methods each analog trace is sampled at inflection points and at geographic reference points. Major assumptions of this procedure are a constant velocity of the vehicle between indicated landmarks, and straight line interpolation between geographic points and inflection points. Therefore, assuming straight line variations between each of the digitized points, the digitized points may be joined by straight lines to recreate the original record.

These values--the time of day, SO_2 TB, SO_2 GL--are entered on punched cards. A set of cards represents one event, which may be a single plume cross section of a few minutes duration or a long distance traverse of several hours. These data are then stored in the computer memory for later use.

All of the geographic location points are digitized from a suitable base map into X and Y coordinates. Each of these coordinates is stored in the computer memory and assigned an ID number. These ID numbers are subsequently used to refer to the geographic points for map making. A Route Index Map, Figure 4, displays all the routes used during the survey (major ones are labeled) and the geographical references (Mississippi and Missouri Rivers, Horseshoe and Carlyle Lakes, and major sources) used on the maps. The St. Louis City Limits are shaded.


IL-16
IL-4
IL-140
IL-159
I-270
I-70
IL-127
I-244
US-40
MO-100
IL-111
IL-159
MO-109
MO-30
I-55
IL-3
N
5km

ROUTE INDEX MAP
EPA/RAPS ST. LOUIS
29 JULY - 3 AUGUST 1974

Figure 4

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

The X,Y coordinates are in kilometers as referenced to the Universal Transverse Mercator (UTM) grid system. The EPA/RAPS survey covered two UTM zones: Zone 15, west of 90° longitude (at Collinsville, IL); and Zone 16, east of that line. (The coordinates are discontinuous at this border.) Because most of the measurements and sources were located in Zone 15 it was used as the reference. Where routes extended east of Collinsville, the X,Y coordinates were extended from Zone 15, rather than use the unrelated Zone 16 system. Spot checks of X,Y coordinates digitized in the UTM Zone 15 system showed a correspondence within ± 0.5 kilometers from values taken from USGS topographic maps.

DATA LISTINGS

The first reporting of the results is in the form of data listings. The two sets of stored data--time/pollutant and geographic--are merged by the computer into listings of five variables in engineering units:

- Time (CDT)
- X Coordinate (km)
- Y Coordinate (km)
- SO_2 TB (ppmM)
- SO_2 GL (ppb)

Appendix A contains 111 pages of these listings for all the measurements made during this EPA/RAPS study. Each event is a separate listing; the event numbers are cross-referenced on the Burden, Flux and Ground Level Maps. From these data listings other workers can determine the date, time, geographic location, overhead burden (SO_2 TB) and ground-level concentration (SO_2 GL) measurements made by EMI. These can be correlated with other data gathered at the same time and place.

WIND DATA

An important parameter in the calculation of pollutant flux is the wind speed at the elevation of the plume. EMI did not collect wind data in St. Louis but relied on other contractors. Wind information was obtained through the EPA/RAPS headquarters and directly from Meteorology Research, Inc. (MRI). Copies of raw pibal data were provided on which in-the-field calculations of wind speed and altitude were noted. The data were gathered at two fixed field sites ("Troop C" and "Downtown" locations) and by aircraft support teams which moved from day to day, depending on the assigned mission.

In general, the pibals were launched on the hour during the day, starting at 0600 CDT. Due to differences in both time and location between the pibals and the AQML movements the wind data were studied by EMI to select appropriate directions and speeds for computer mapping.

First it was necessary to determine the altitude of the plume so that proper winds could be chosen for flux calculations. By reviewing the MRI computer-stored data (in Dr. Rudolph Husar's laboratory at Washington University, St. Louis, MO) for each day the plume height was determined with the bottom level modified depending on whether or not the EMI ground-level data showed touchdown of the plume. Strong shear layers, if present, were used also to help determine plume height. After the plume height was determined, each hourly pibal was averaged for both direction and speed.

Next, each Flux Map route was considered to determine which of the pibals were appropriate (typically 20-30 km away from the plume measurements) and whether more than one wind direction or speed was necessary (because of a long time span or a sudden change in the wind). To account for the variations in the times and locations of the pibal measurements interpolation was necessary to obtain representative wind speeds and directions. The interpolation was done on an individual basis depending on the time and space differences and on the trends in the wind data.

A final adjustment in wind directions was made upon checking the EMI plume data to determine the compass angle of the line from the source(s) to the measured plume peak(s). This figure usually was within five degrees of the averaged pibal direction. On occasions where the difference was substantial, the weather was generally turbulent with fluctuating wind directions. In such cases, the direction determined from the EMI plume data was used for map plotting.

A complete listing of all wind data selected and used by EMI is presented in Table III. It is important to remember that these wind data were derived from preliminary informa-

Table III

Selected Pibal Data

DATE	EVENT	PLUME HEIGHT (M)		AVERAGE WIND DIRECTION (°)	AVERAGE WIND SPEED (M/S)
		BASE	TOP		
29 July	5,7	438	960	314	4.9
29 July	9,12	438	960	315	5.5
29 July	13 -17	438	960	320	6.1
30 July	4,5	Ground	1088	285	4.6
30 July	6,7	Ground	1088	300	4.0
30 July	8-12	297	1088	292	4.0
31 July	6	297	960	207	1.7
	8	297	960	250	1.4
"	11,13	297	960	255	1.5
"	14,15	297	960	250	1.5
"	17,19	Ground	832	260	1.6
"	23	Ground	832	278	3.0
1 Aug	2,3	Ground	574	260	6.9
"	4	Ground	704	260	5.2
"	5	Ground	704	260	5.2
"	6	Ground	704	260	5.2
"	7,9	Ground	704	285	2.5
"	11,12	Ground	704	260	1.9
31 July	5	297	960	205	1.8
"	7	297	960	252	1.3
"	10	297	960	253	1.5
"	16	Ground	832	256	1.6
"	20	Ground	832	272	2.2
"	21	Ground	832	272	2.5
"	22	Ground	832	278	2.8
29 July	8	438	960	315	5.5
"	11	438	960	315	5.5
2 Aug	3	297	960	235	8.1
"	5	297	1088	235	7.8
3 Aug	3	Ground	1088	308	5.5
"	5	Ground	1088	295	5.0
"	8	Ground	1088	265	5.9
"	10,11	297	960	266	7.0
"	12-17	297	1088	264	6.3
"	18,19	297	960	264	5.1
"	20-22	297	960	273	6.0

tion and are subject to change after final processing by EPA at Research Triangle Park.

FLUX CALCULATIONS

The computation of SO_2 flux--emission rate of a source--is derived from the COSPEC total burden data, the geography, and the wind speed according to the following formula:

$$\begin{array}{ccccccccc} \text{SO}_2\ \text{FLUX} & = & \text{TOTAL BURDEN} & \times & \text{TRAVERSE LENGTH} & \times & \text{WIND SPEED} & \times & \text{WIND/ROAD ANGLE} \\ \left(\frac{\text{gms}}{\text{sec}}\right) & = & \left(\frac{\text{gms}}{\text{meter}^2}\right) & \times & (\text{meters}) & \times & \left(\frac{\text{meters}}{\text{sec}}\right) & \times & (\sin\alpha) \\ [\text{Emission}] & & [\text{Cospec Reading}] & & [\text{Map Distance}] & & [\text{Pibal}] & & \end{array}$$

The AQML measured the Total Burden and the geographic data for determining the Traverse Length and the Wind/Road angle; the only parameter not measured by EMI in St. Louis was the Wind Speed.

The computer stored data (the same numbers in the Data Listings) are manipulated by a proprietary computer program to calculate SO_2 Flux over each segment of road travelled by by the AQML.

The accuracy of the resulting computations can be estimated. There are six identifiable sources for error in the data collection and processing procedures which lead to the SO_2 Flux calculations: spectrometer precision, spectrometer calibration, spectrometer record interpretation, wind speed, wind direction and burden location. Each of these errors is a random quantity which takes on different (and unpredictable) values from traverse to traverse. The first three error sources are related to the operation of the spectrometer; the next two pertain to wind data used in the flux calculations; the last occurs in transferring original data records onto digitized maps.

COSPEC III non-linearity (above 500 ppmM) is treated as part of the spectrometer calibration error component. The calculated instrument sensitivity is used to convert the digitized spectrometer outputs from millivolts to parts-per-million-meters. Corrections for occassional readings greater than 500 ppmM are made prior to the calculation of flux.

An estimate of the probable error in the Flux results can be made by assigning individual values to each of the six component errors (V_i) and making a root-mean-square calculation. The equation is:

RMS Error = $\sqrt{V_1^2 + V_2^2 + \ldots + V_n^2}$, where V_i is the RMS

error of one of the contributing sources of error. The term "RMS Error" means the average of the square of the percent deviation of the measured (or calculated) value from the true value. Expressed symbolically, if the measured value of a quantity (whose true value is X) is X(1 + E/100), then E is the percent error in the measurement. The RMS error in the measurement of X is the average (taken over a number of observations under identical conditions) of the squared value of E.

The values assigned to each error for data in this report are:

Spectrometer precision	±7%	(average noise level over range of measured values)
Spectrometer calibration	±5%	(actual variation in field calibrations)
Spectrometer interpretation	±5%	(typical strip chart record readability)
Wind speed	±20%	(average variation over range of speeds encountered)
Wind direction	±12%	(average error in determining wind direction (*a*) when converted to sine *a*)
Burden location	±7%	(combined typical field reading and data handling errors of time and location)

The computed RMS Error is therefore:

$$\text{RMS Error} = \sqrt{(7)^2+(5)^2+(5)^2+(20)^2+(12)^2+(7)^2}$$

$$= \pm 26\%$$

This RMS Error incorporates all known sources of error in making remote sensor measurements and converting the results to emission rates. Its actual value for each measurement may be less than ±26%. For example, if the actual wind speed error was ±10% (rather than ±20% estimated for pibal data gathered some distance from the Total Burden COSPEC data) the RMS Error would be reduced to ±20%. To accurately determine a flux value a number of separate measurements are made and the results are averaged; this averaging procedure cancels out random errors and reduces the probable error by a factor of two or more. Therefore, while the RMS Error of a remote sensor flux value may be as high as ±26% for one particular measurement, it is often significantly less.

FLUX MAPS

A companion computer program to the flux calculation produces computer plotted maps of the flux values on a map relative to the sources being studied. These maps (See Section 4) display flux lines on the roads traveled by the AQML. The lines extend from the roadway in the direction of wind flow; the length of the lines is proportional to the Flux, calibrated in metric tons per day (MT/D)rate of SO_2 emissions. A plume anomaly recorded on the original data in parts per million-meters (ppmM) thus appears on the map as modified by the wind speed and direction as flux lines showing the "shape" of the overhead gas. By summing the lines for a given plume the total emission rate can be determined directly from the map. This is true for all but the 29 July maps where close-in plume traverses resulted in SO_2 burdens beyond the calibration range of the spectrometer; flux lines on these three maps are not to scale above 100 MT/D.

The 34 maps in this report contain geographical references (outlines of rivers, St. Louis City limits) and locations of major sources. The small squares are power plants (Labadie, Portage des Sioux, Meramec, Wood River, Venice, Cahokia) and the triangles are other industrial sources (NL Industries titanium plant, oil refineries in the Wood River area, and Granite City Steel Complex). The geographic scale and the SO_2 flux scales are shown on each Flux Map; the selected wind speed labels the wind arrow.

In addition to Flux Maps there are nine SO_2 Ground Level and two Burden Maps. The ground-level data are plotted as ladder rungs, lines normal to the traverse route; they are calibrated in parts per billion (ppb) SO_2. (The sulfur monitor detected Total Sulfur; however, for this study the target gas was SO_2 and the reasonable assumption has been made that the ground-level gas measured was largely, if not all SO_2). The data lines may be scaled for direct reading of SO_2 concentrations.

The Burden Maps show original COSPEC data (ppmM SO_2) plotted vertically on the road; the roads appear as a solid line to help distinguish the Burden Map from the Flux Map. The two Burden Maps in this report are for 1 August; high concentration SO_2 Burdens were recorded near the Labadie Power Plant--once on a traverse nearly axial to the plume.

The Burden lines reflect the non-linear COSPEC response very near to the source; they may be scaled for direct reading for values no greater than 500 ppmM.

Section 4

RESULTS

DATA LISTINGS

All of the results of EMI's EPA/RAPS survey are reported in map or tabular form. Appendix A contains the Data Listings of all moving measurements; the lists are preceeded by an index. These listings present the data base for the flux calculations and maps; they are a complete record of the AQML activities during the 29 July - 3 Aug 74 measurement period. They can be used to cross reference the maps and to correlate results with data collected by other workers.

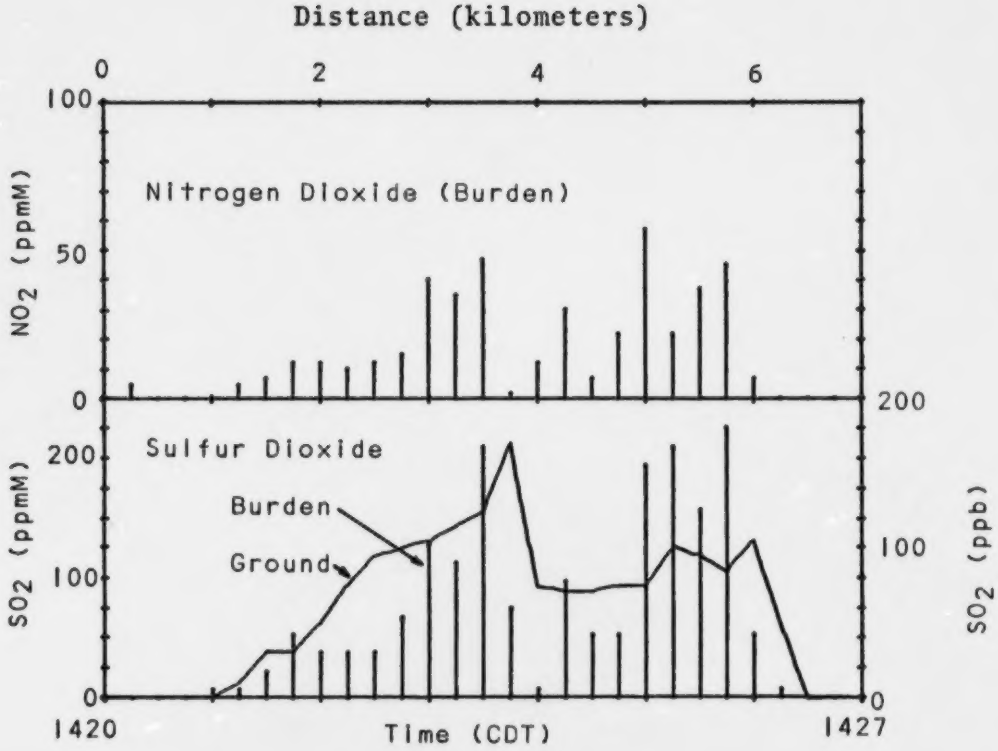
An example of AQML data, which is a combination of remote and point sampling air quality information, is shown in Figure 5. The plot presents three separate measurements made simultaneously while traveling north on I-55 five kilometers southwest of the Meramec Power Plant. The data are striking because the three measurements "tracked" each other as the AQML traveled the seven kilometer distance (at 17 m/s). The winds were light and variable; a flag showed virtually no surface wind. The pollutant cloud which was detected on and over the highway was apparently a stagnant, homogenous polluted air mass that had drifted from the Meramec Power Plant. While the NO_2 and SO_2 emission rates of the cloud cannot be determined because of the lack of a positive, steady wind field, the data serve to illustrate how the AQML detects polluted

Figure 5

Meramec Cloud

31 July 1974

Event 23.01



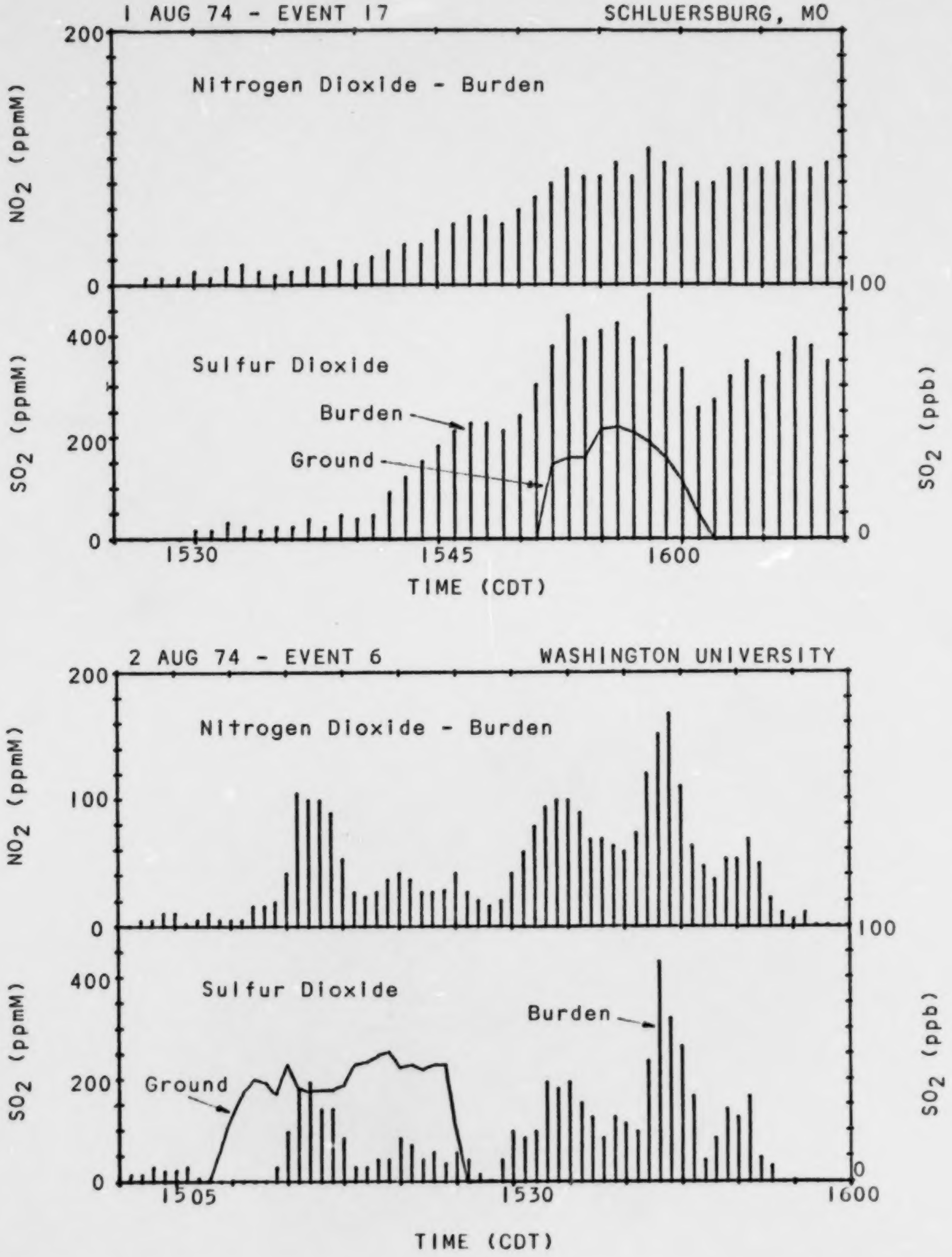
air masses and records the overhead burdens as well as the ground-level concentrations.

Two additional events on two other days (1,2 Aug 74) are presented in Figure 6 as graphs of raw data showing the passing of an overhead cloud of SO_2/NO_2 which touched the ground at one point during the measurements. The data were collected from the stationary AQML; both COSPEC SO_2 and NO_2 Total Burdens and Ground-Level SO_2 are plotted with respect to time. In each event the gas build-up over the instrumented van is clearly shown. Plume touchdown occured both times. On 1 Aug 74 the Labadie plume, influenced by light and variable winds moved overhead near Schluersburg, MO; the plume touched down in-phase with peak Total Burden readings. The Washington University data for 2 Aug 74 show touchdown during the early peak but lack of ground-level data during a second, stronger peak. The weather was stormy; a rain shower occured minutes before Event 6 was recorded. Either the campus power plant plume was being sensed under the influence of rotating winds or, perhaps an unidentified local source was being detected.

On 3 August the MRI aircraft and the EMI moving laboratory rendezvoused at the intersection of highways IL-160 and IL-140 north of Grant Fork, Illinois to make simultaneous SO_2 measurements through the atmosphere. Data gathered by the spiralling MRI

Figure 6

Stationary Plume Monitoring



aircraft show an average of .015 ppm SO_2 up to 4000 feet (1219 meters) altitude. This converts to a Burden (.015 ppm x 1219 M) of 18 ppmM SO_2 for the 1327-1336 CDT spiral.

The EMI Burden measurements were conducted at 1400-1426 CDT. While the two types of measurements were not exactly coincident in time, a comparison can be made because the wind was relatively stabile at that time. When the AQML arrived at the rendezvous site the COSPEC read 38 ppmM SO_2; it fluctuated between 15 ppmM and 83 ppmM with an average for the 26 minute test of 53 ppmM SO_2. As noted on the SO_2 Flux map for 3 August (Events 13-17) these measurements were made within a 10 km-wide plume later idenfified as originating from the Wood River Complex.

SO_2 MAPS

The maps which were plotted from the computer stored data sets are presented in daily groups. A narrative description and index of each group preceeds each day's maps. The Ground-Level Maps are reproduced on translucent material; they are bound in the report as overlays of the Flux or Burden Maps to facilitate the visual reporting of the simultaneously gathered data.

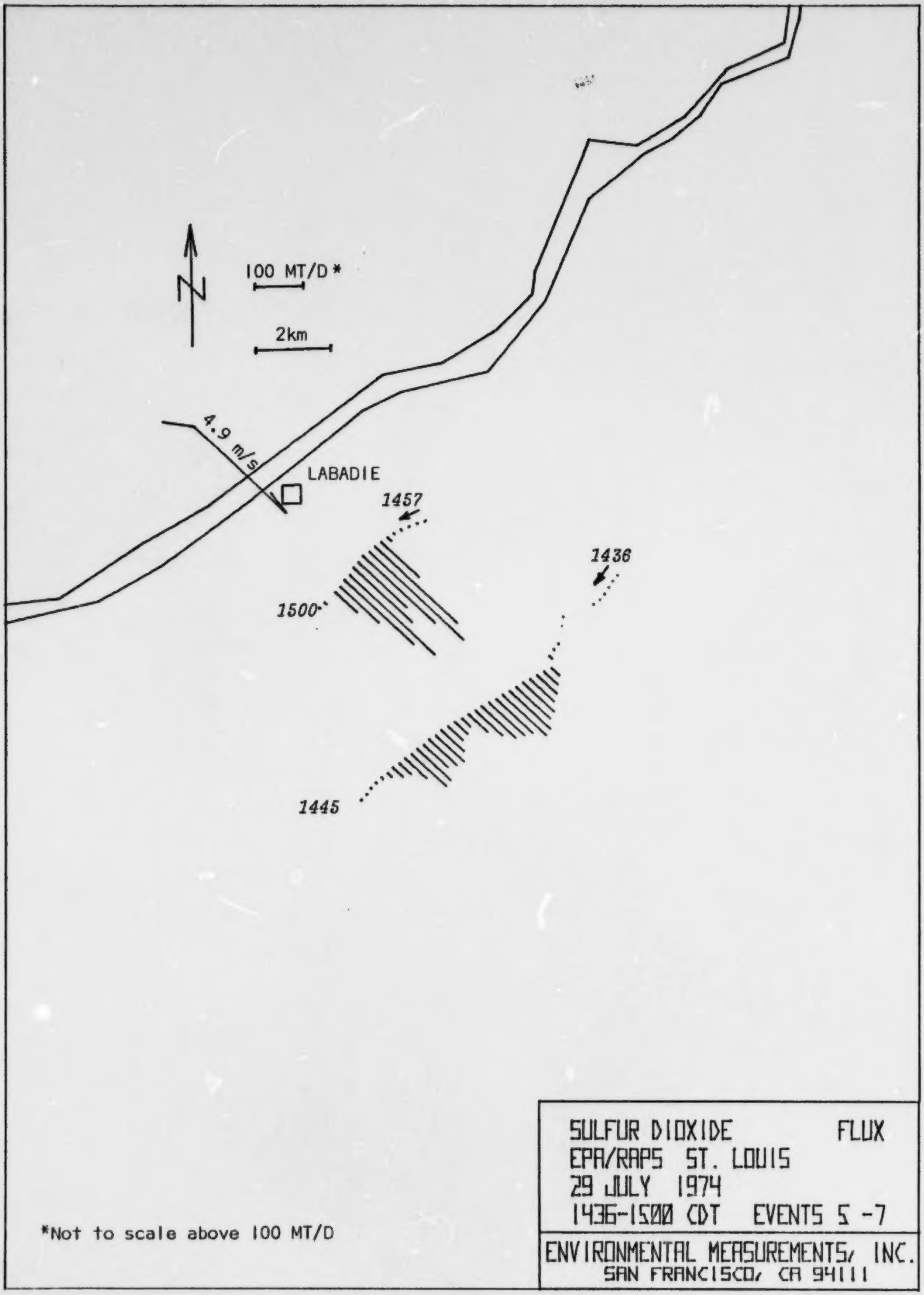
29 July 74 - Labadie Plume

Eight of 12 total plume cross sections made of the Labadie plume are plotted. The wind was steady from the northwest.

Events 5,7 - The two plume traverses at two and eight kilometers both show bi-modal distributions with the plume spreading downwind.

Events 9,12 - One and two kilometer close-in measurements; the plume was narrower than measured earlier.

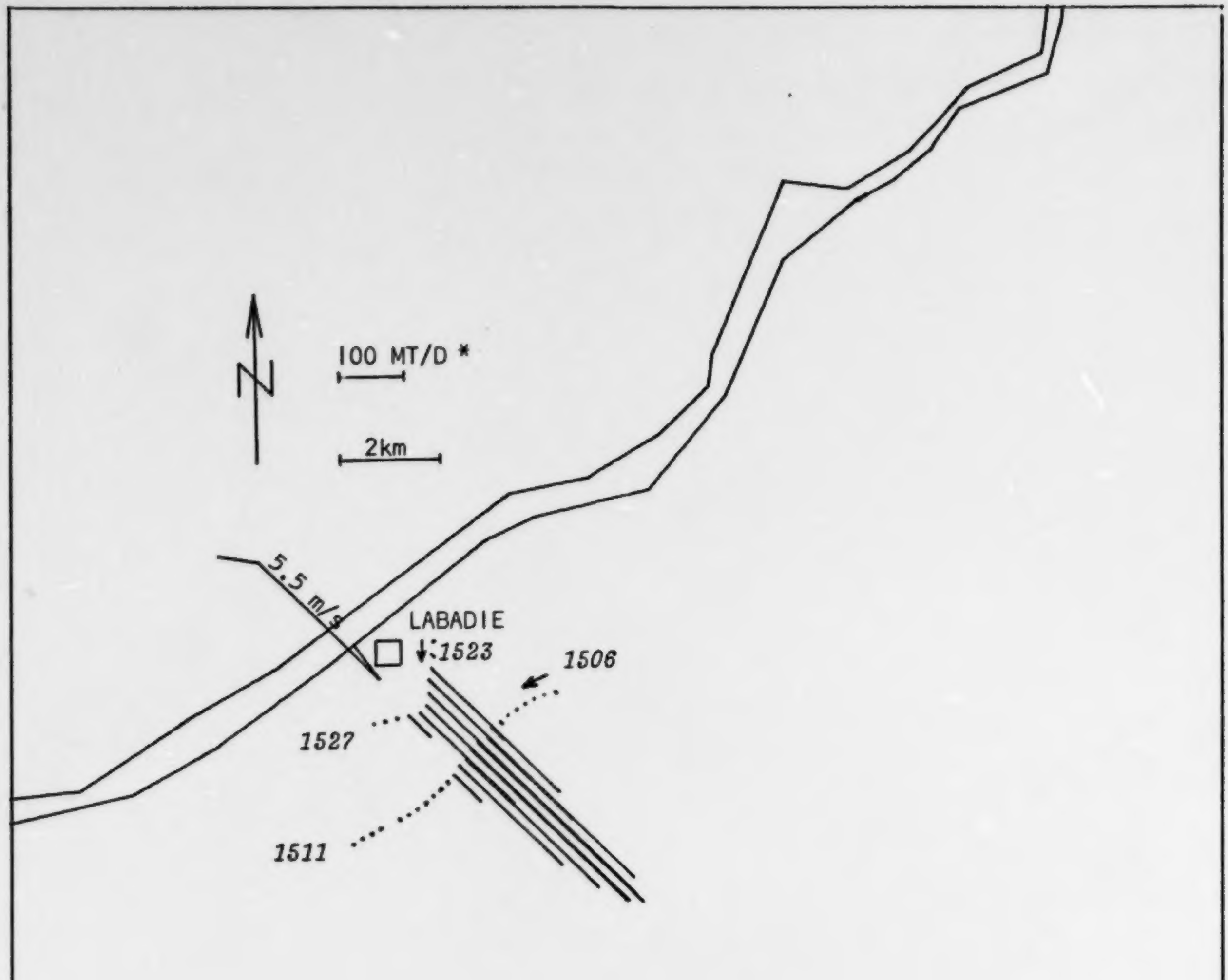
Events 13-17- The four transects show consistent wind direction for nearly one hour. The "Z" pattern traverse is useful for measuring plume dispersion (See Section 5). (Event 16 is not plotted.)


100 MT/D *
2km
4.9 m/s
LABADIE
1457
1436
1500
1445

*Not to scale above 100 MT/D

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
29 JULY 1974
1436-1500 CDT EVENTS 5 -7

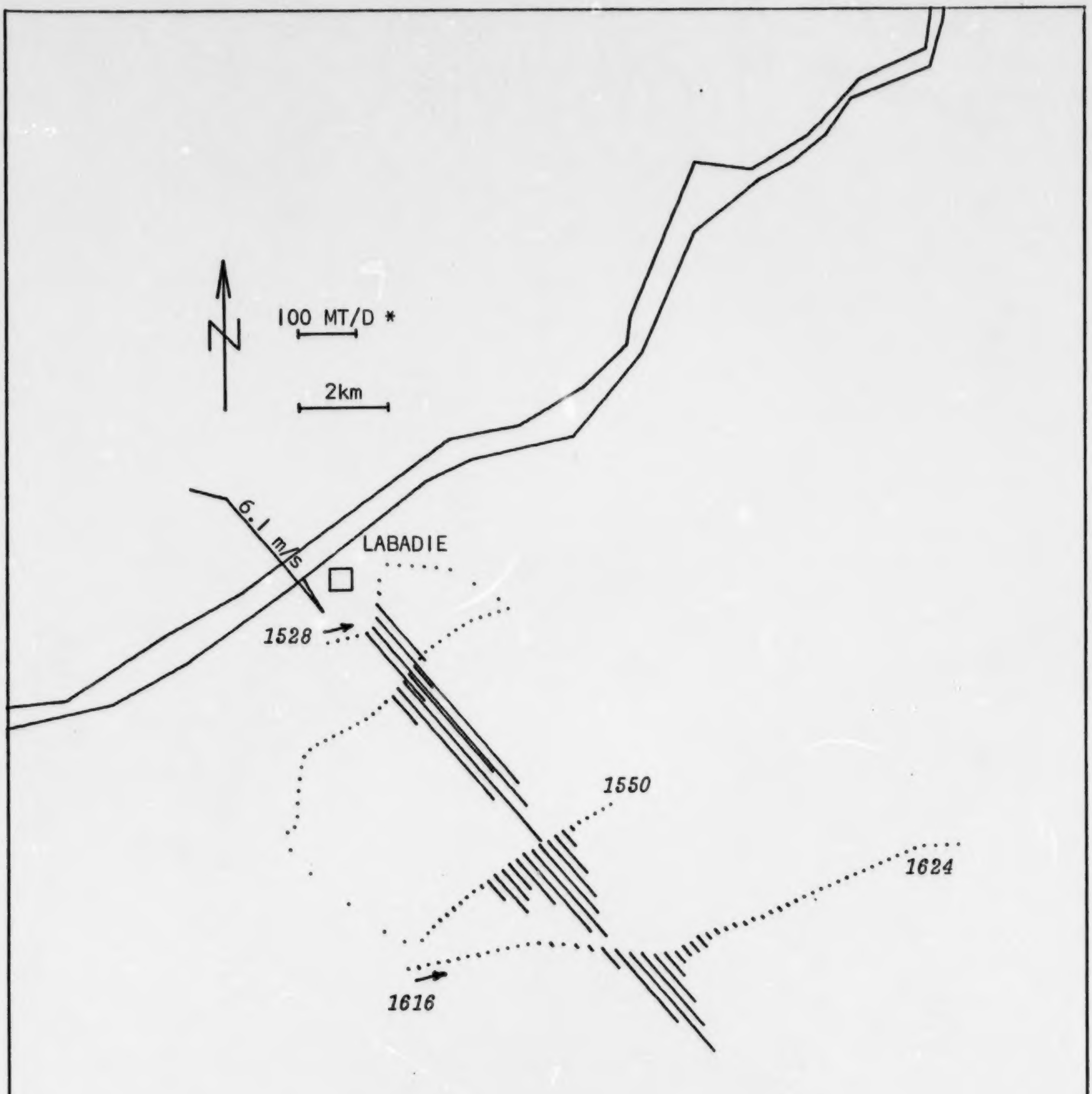
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


100 MT/D *
2km
N
5.5 m/s
LABADIE
1523
1506
1527
1511

*Not to scale above 100 MT/D

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
29 JULY 1974
1506-1527 CDT EVENTS 9 -12

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


N
100 MT/D *
2km
6.1 m/s
LABADIE
1528
1550
1624
1616

*Not to scale above 100 MT/D

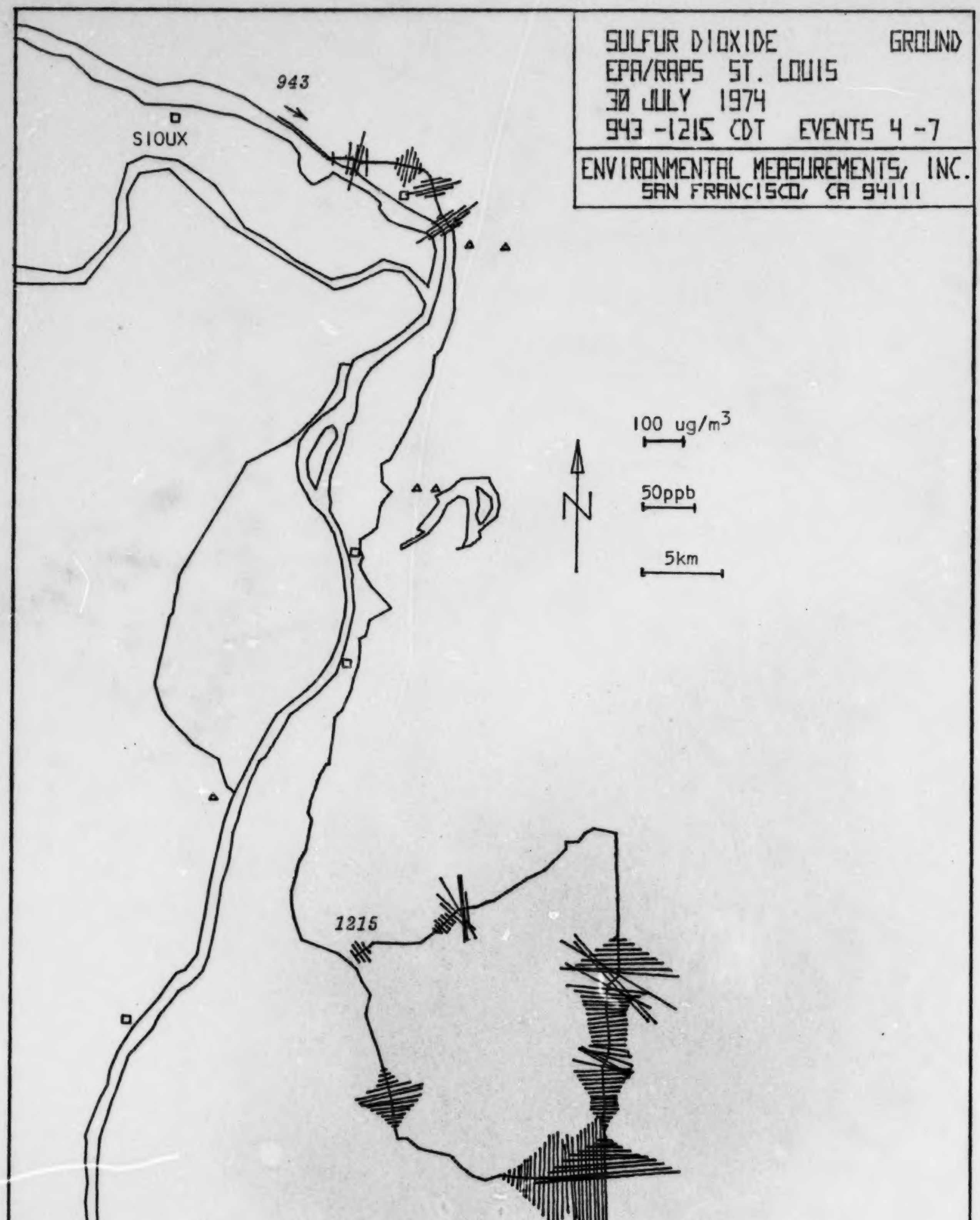
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
29 JULY 1974
1528-1624 CDT EVENTS 13-17

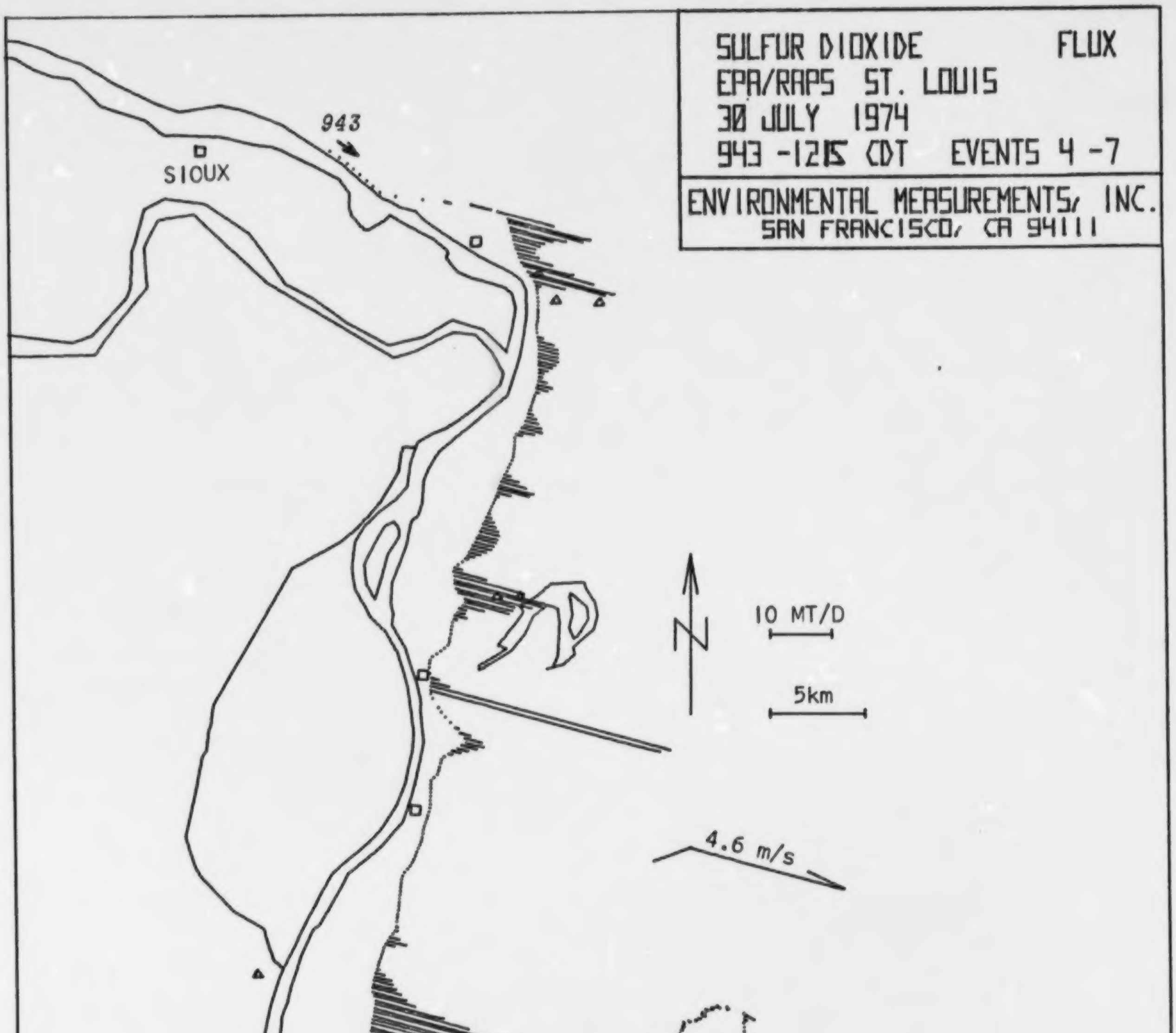
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

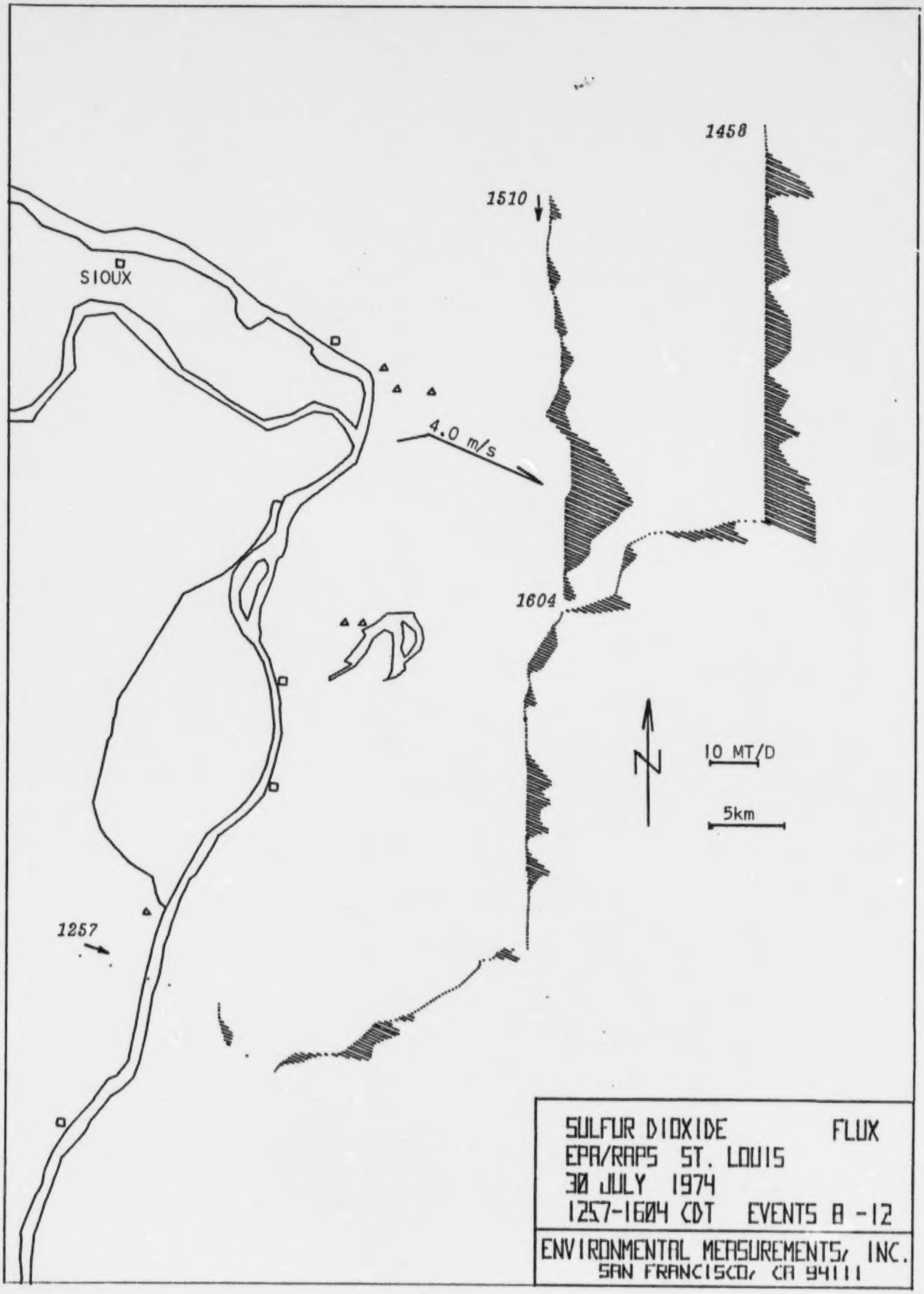
30 July 74 - Urban Plume

Events 4-7 - The morning search for the urban plume spanned over two hours of measurements under varying wind conditions. Northerly sources were relatively inactive; to the south the NL Inudstries' plant and the Meramec Power Plant plumes were detected 30 kilometers away. Ground-level SO_2 to 140 ppb was detected.

Events 8-12 - The entire afternoon survey of five hours duration is displayed. Relatively low levels of gas were detected. The major plume appears to be a combination of several sources. Wind conditions were gusty which prevented the measurement of the same plume more than once at a given location; no significant ground-level SO_2 was measured.


SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
30 JULY 1974
943 -1215 CDT EVENTS 4 -7
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111
943
SIOUX
100 ug/m3
50ppb
5km
N
1215


SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
30 JULY 1974
943 -1215 CDT EVENTS 4 -7
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111
943
SIOUX
N
10 MT/D
5km
4.6 m/s
1215
4.0 m/s


SIOUX
1458
1510
4.0 m/s
1604
10 MT/D
5km
1257

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
30 JULY 1974
1257-1604 CDT EVENTS 8 -12

ENVIRONMENTAL MEASUREMENTS, INC.
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31 July 74 - Labadie Plume

Nine plume profiles are plotted of the 17 plume crossings made during the day at Labadie.

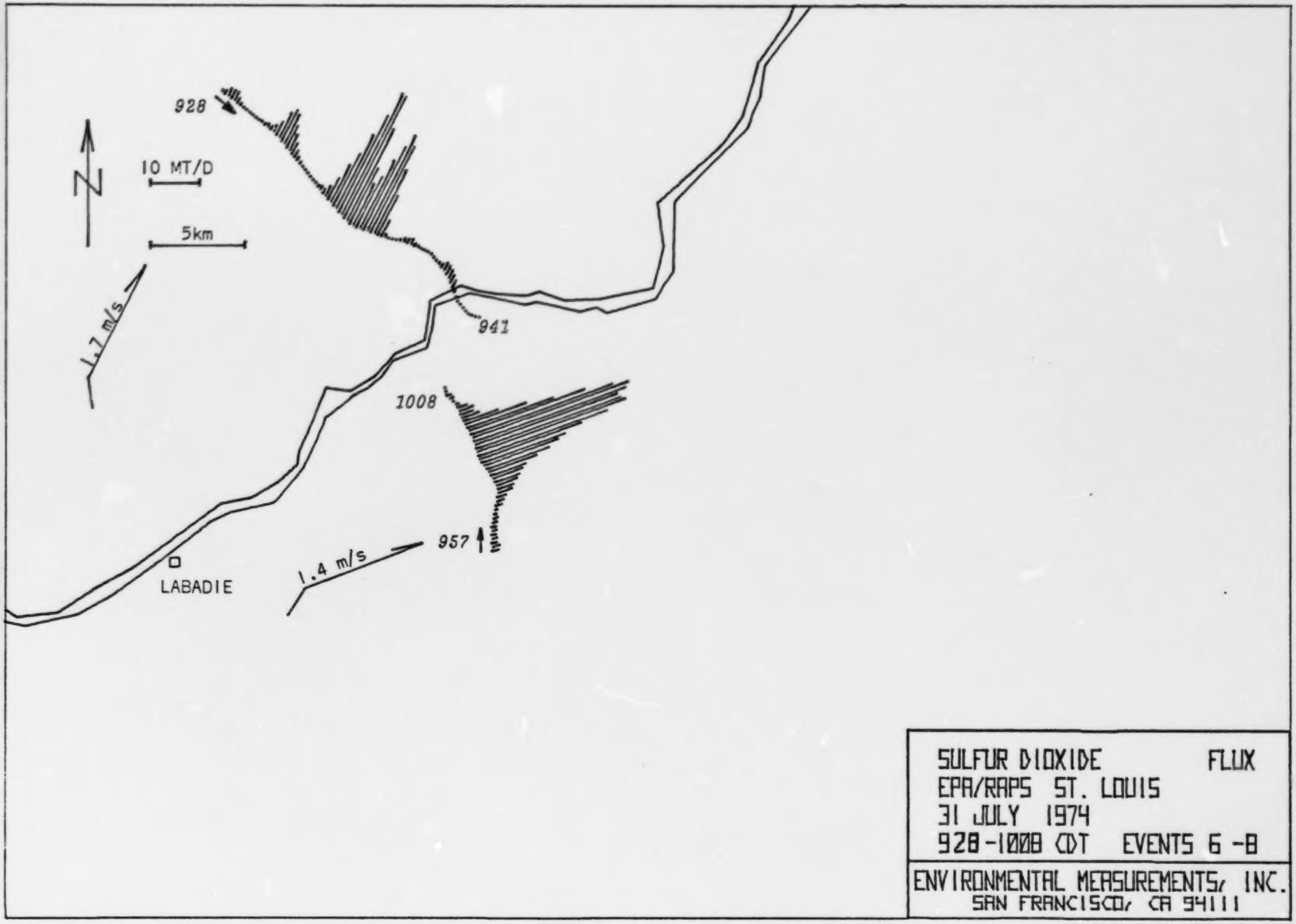
Events 6,8 - The plume was first encountered northeast of the plant across the Missouri River. Visual observations confirmed that the wind--and hence the plume--was shifting. Event 8 confirmed the wind rotation when the plume was measured south of the river.

Events 11,13 - Two profiles at 17 km and 22 km from the stacks show the late morning wind direction; the overlapping flux plots have similar two-peak shapes.

Events 14,15 - Moving downwind (to 22 km and 29 km) the plume was measured repeatedly; only two consecutive traverses are shown as representative measurements at these distances.

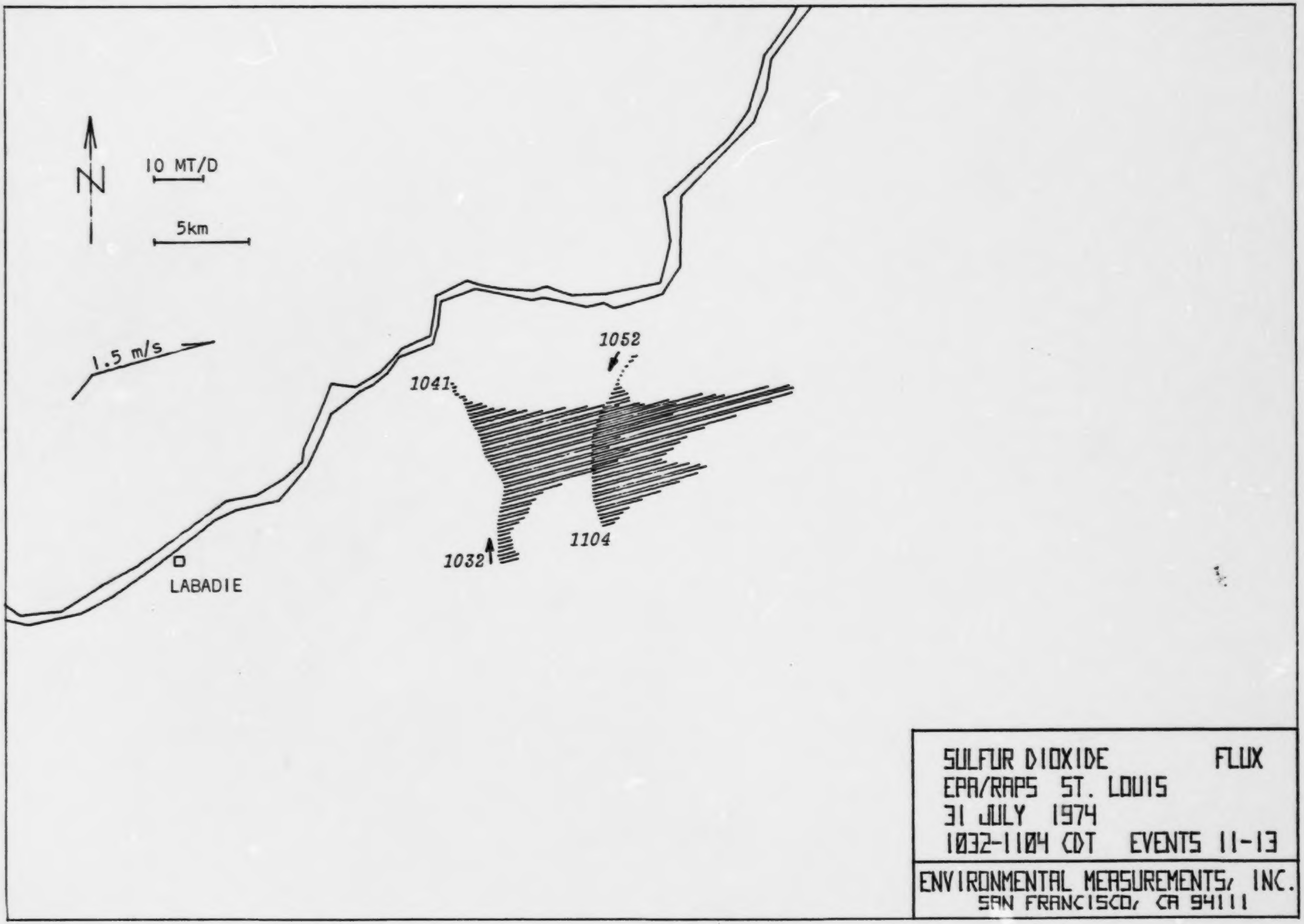
Events 17,19 - In the early afternoon the plume was located 29 km and 34 km downwind. Touchdown was first detected during Event 17; plume touchdown increased significantly for Event 19 (58 ppb SO_2 peak).

Event 23 - By late afternoon the wind had rotated further clockwise. The plume had broadened and touchdown (80 ppb SO_2 peak) was measured 43 kilometers from the plant.


928
10 MT/D
5km
1.7 m/s
941
1008
957
1.4 m/s
LABADIE

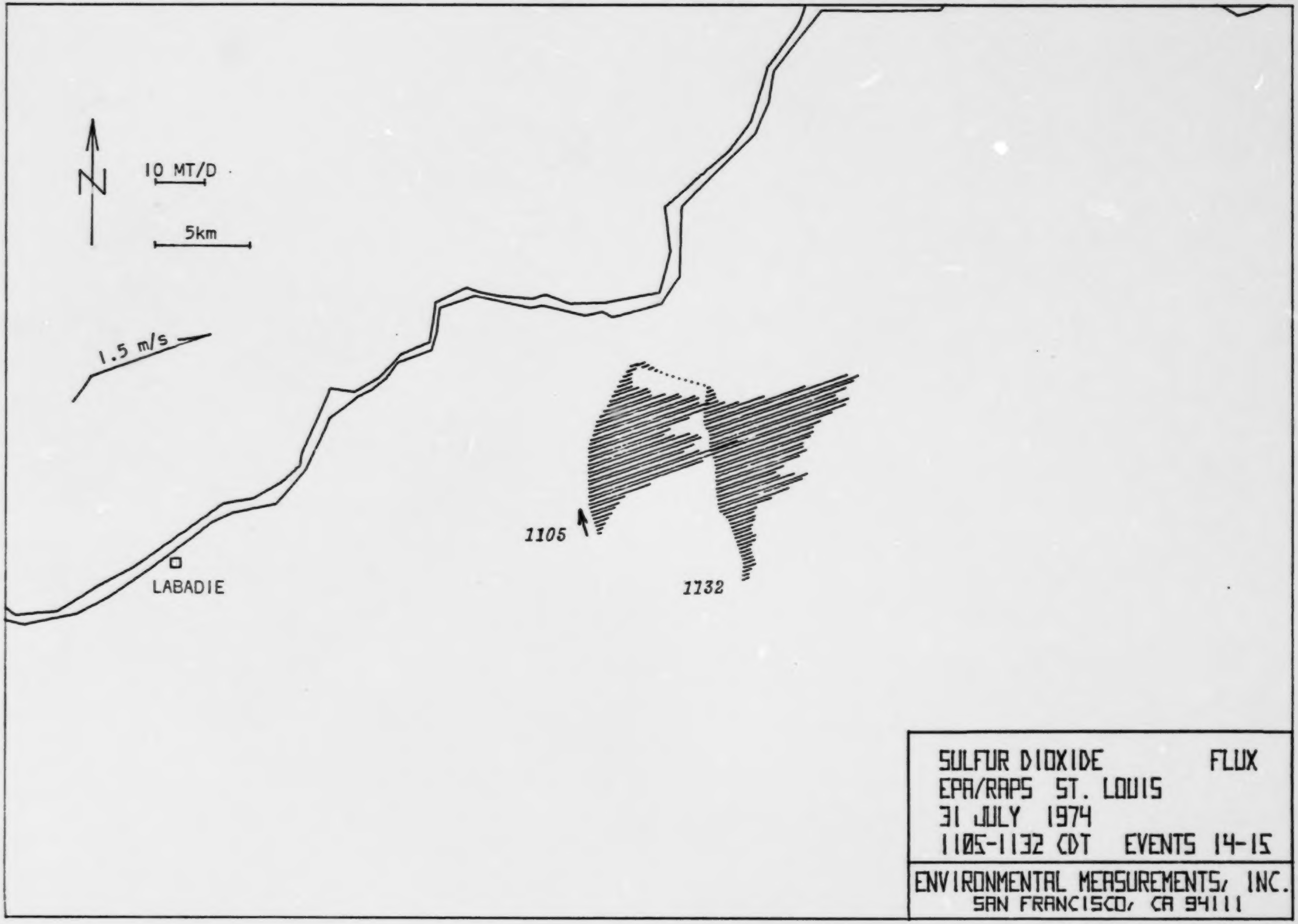
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
31 JULY 1974
928-1008 CDT EVENTS 6-8

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


10 MT/D
5km
1.5 m/s
LABADIE
1041
1052
1032
1104

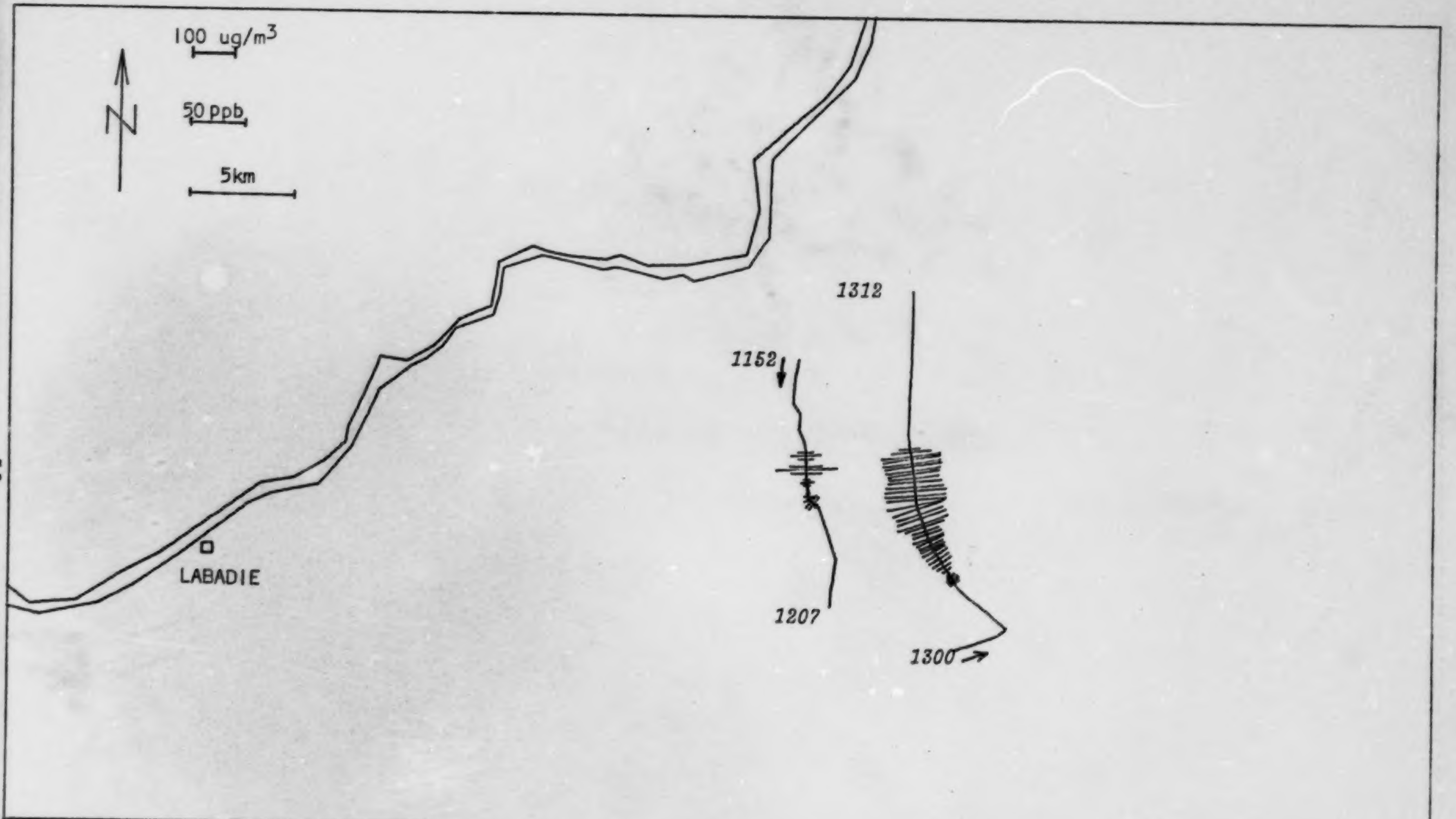
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
31 JULY 1974
1032-1104 CDT EVENTS 11-13

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


10 MT/D
5km
1.5 m/s
LABADIE
1105
1132

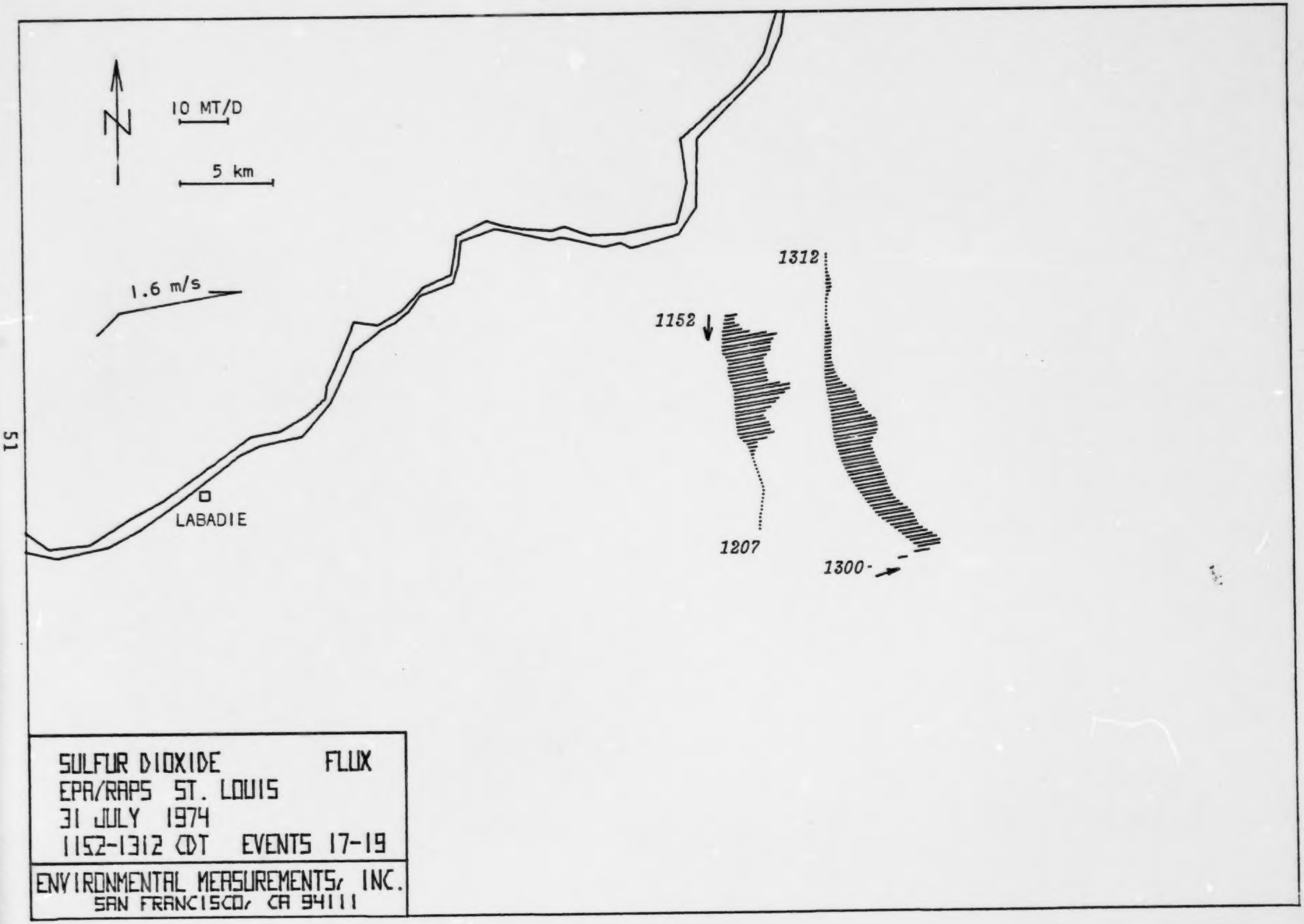
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
31 JULY 1974
1105-1132 CDT EVENTS 14-15

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


100 ug/m^3
50 ppb
5km
N
LABADIE
1312
1152
1207
1300

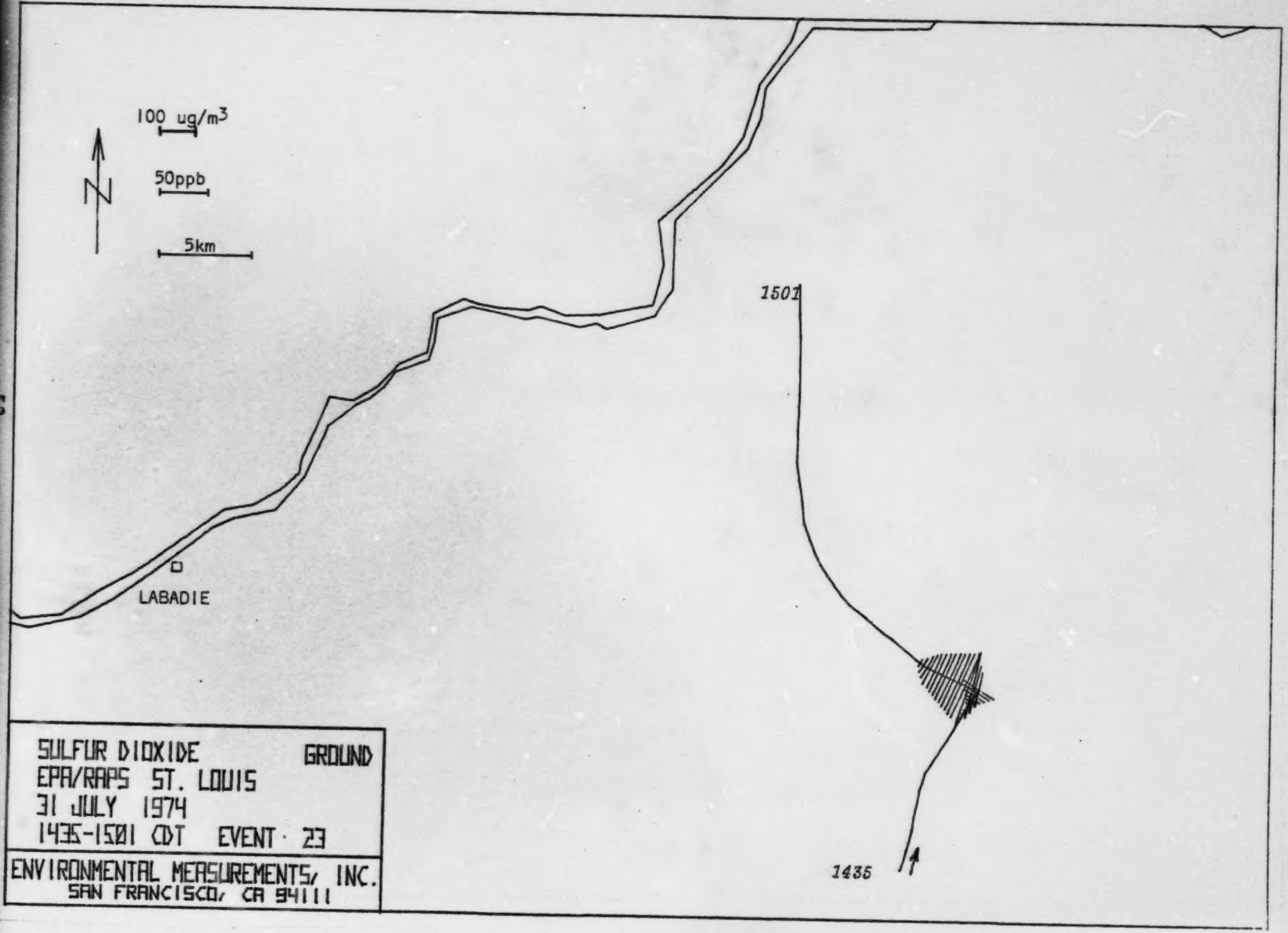
SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
31 JULY 1974
1152-1312 CDT EVENTS 17-19

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


10 MT/D
5 km
1.6 m/s
LABADIE
1152
1207
1312
1300

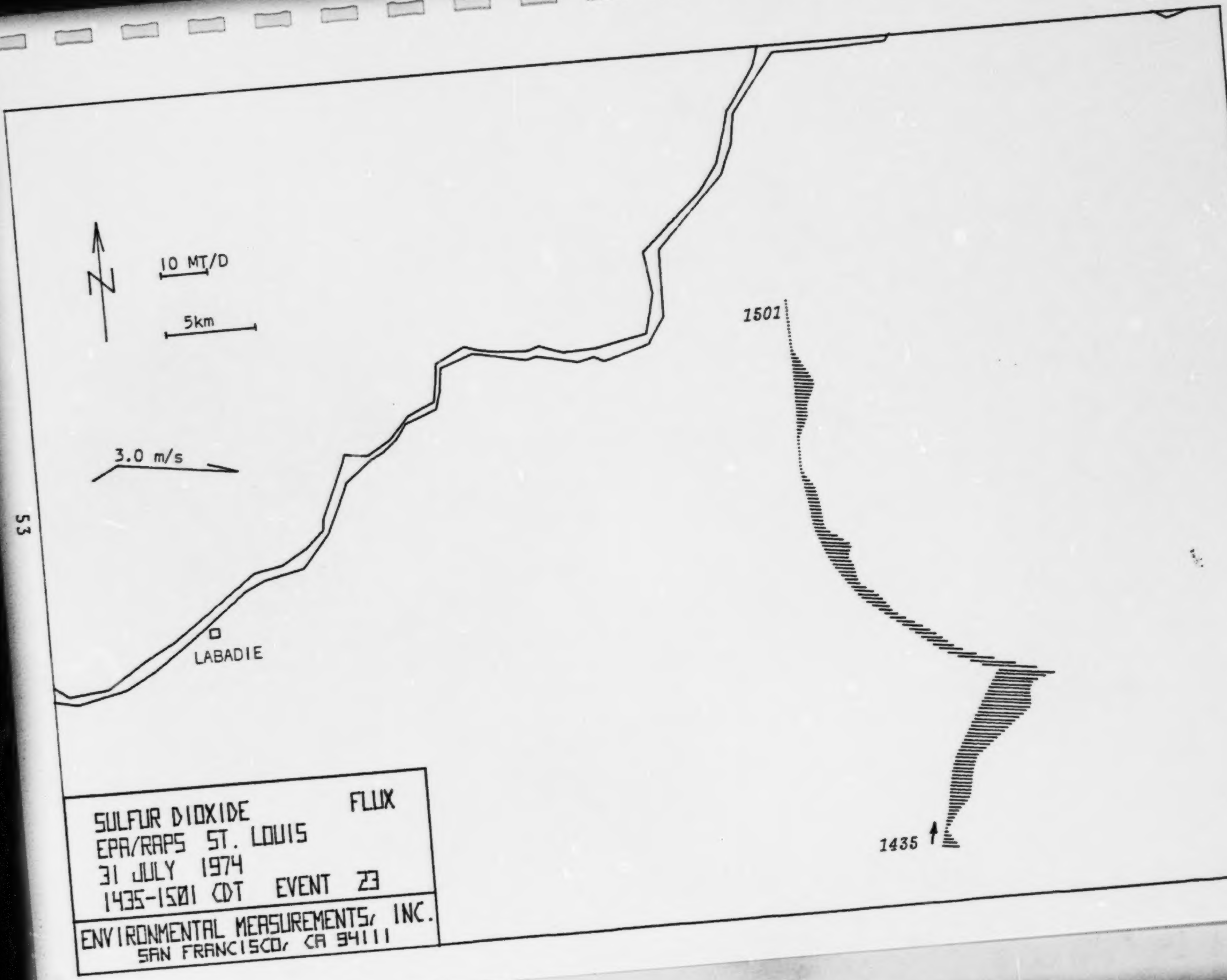
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
31 JULY 1974
1152-1312 CDT EVENTS 17-19

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


100 ug/m3
50ppb
5km
N
LABADIE
1501
1435

SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
31 JULY 1974
1435-1501 CDT EVENT · 23

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


10 MT/D
5km
3.0 m/s
LABADIE
1501
1435

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
31 JULY 1974
1435-1501 CDT EVENT 23

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

1 Aug 74 - Labadie Plume

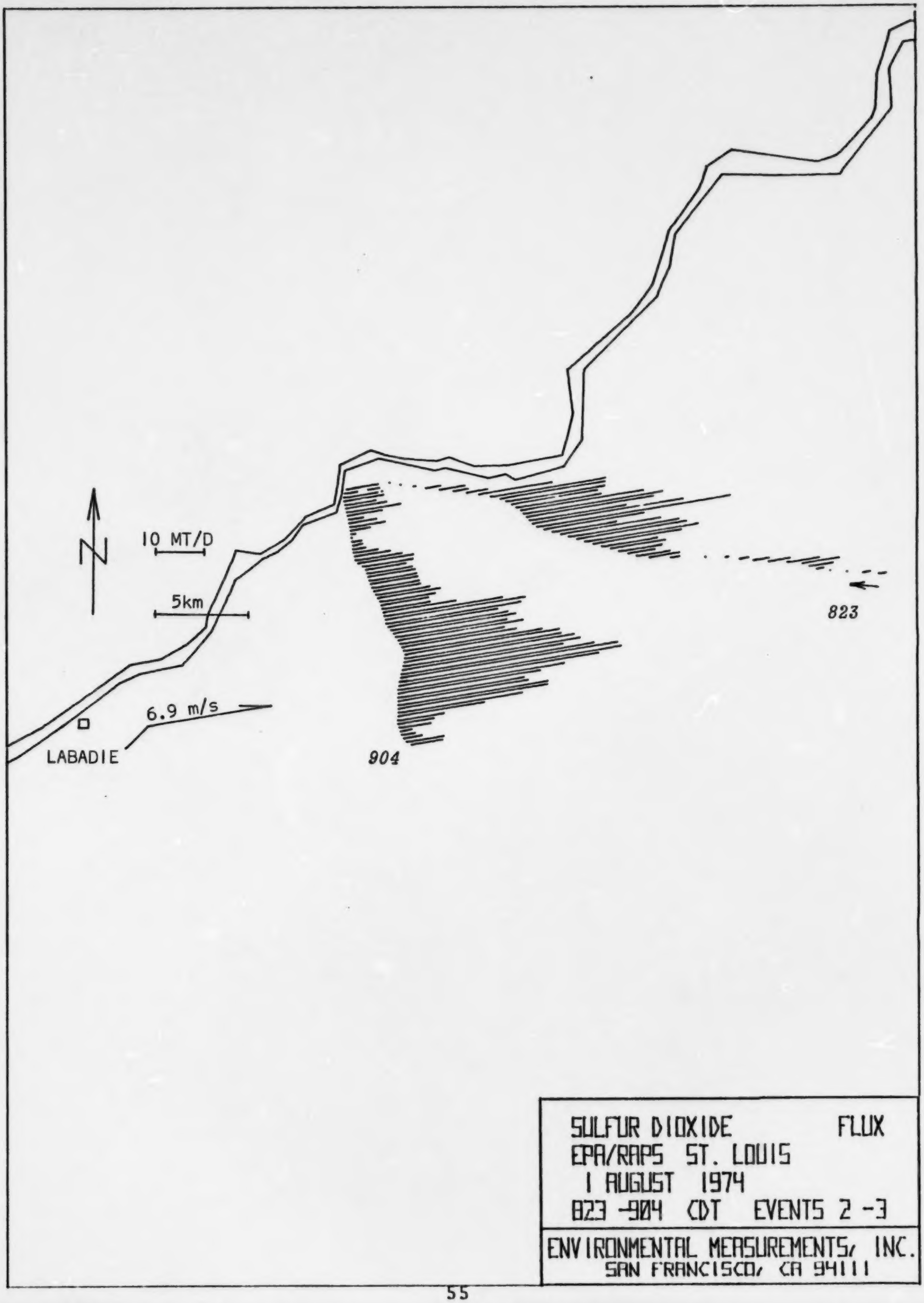
Event 2-3 - The Labadie Plume was first encountered on US 40 enroute to the plant. Before turning south the wind became slightly more westerly as shown by the second plume crossing (only the second wind arrow is drawn).

Event 4,5,6 - The plume was re-crossed at the 17 km distance five times. The change in plume profile is evident from the three representative maps. No touchdown was recorded indicating that the plume had been held aloft above the morning inversion.

Events 7-9 - Plume touchdown (125 ppb peak) occured at 18 km after a change in meteorology (the MRI aircraft reported a breakup of the inversion). The broad plume at 30 km did not touch down.

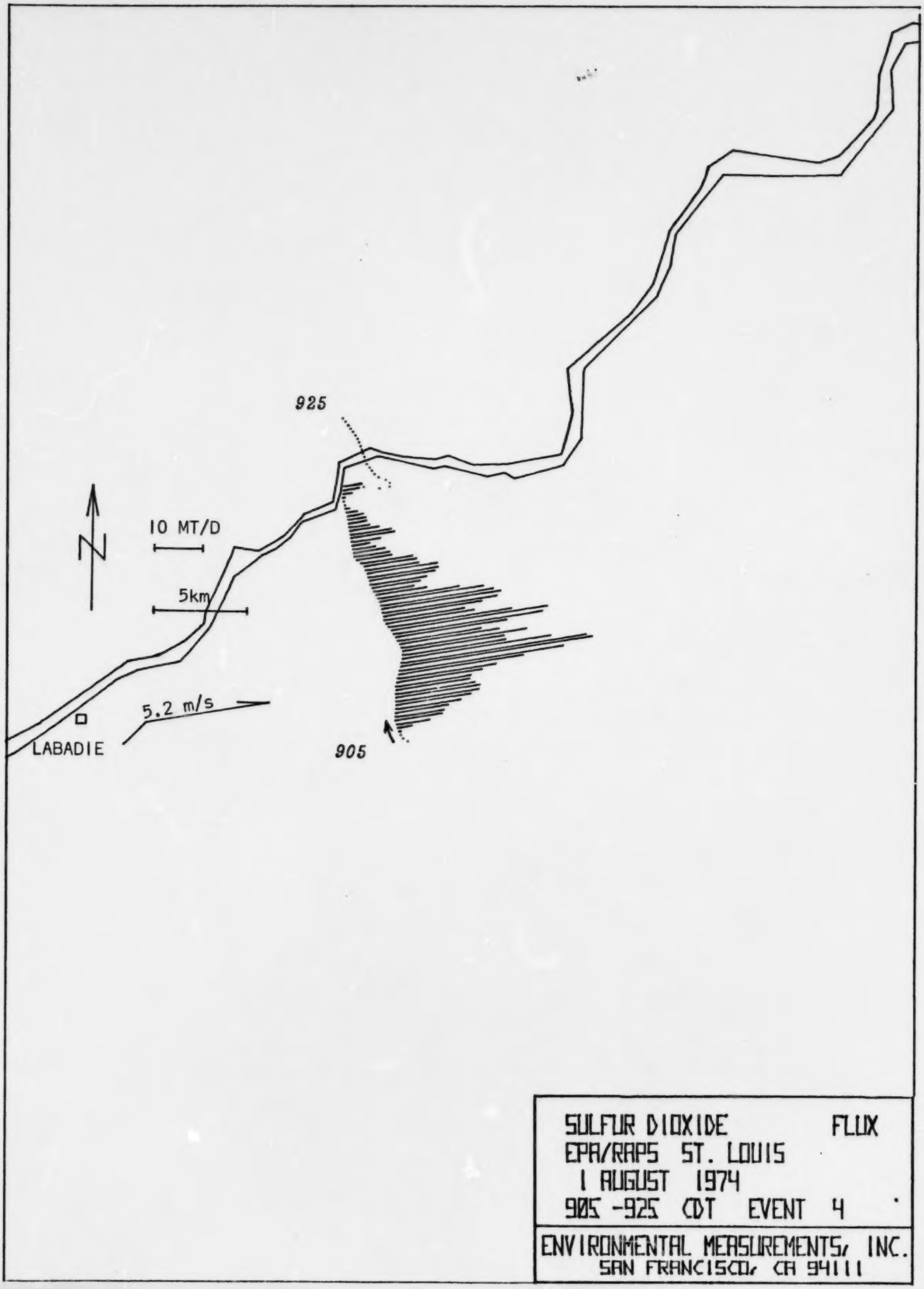
Events 11-12 - With the lightening winds the ground-level SO_2 began to increase; an axial traverse westward from 30 km, was attempted to seek out the point of maximum concentration. The plume was lying over some convenient traverse roads but, as the maps show, the AQML path deviated from the plume centerline. Peak SO_2 Total Burden was 2111 ppmM; peak SO_2 ground-level was 1100 ppb; both were measured within 6 km of the Labadie stacks.

Events 15-16 - As winds became increasingly light and variable a traverse was made north of the Missouri River to search for other areas of high SO_2 concentrations. They were lower than near the plant but drifting pockets of power plant effluents were widespread.


10 MT/D
5km
6.9 m/s
LABADIE
904
823

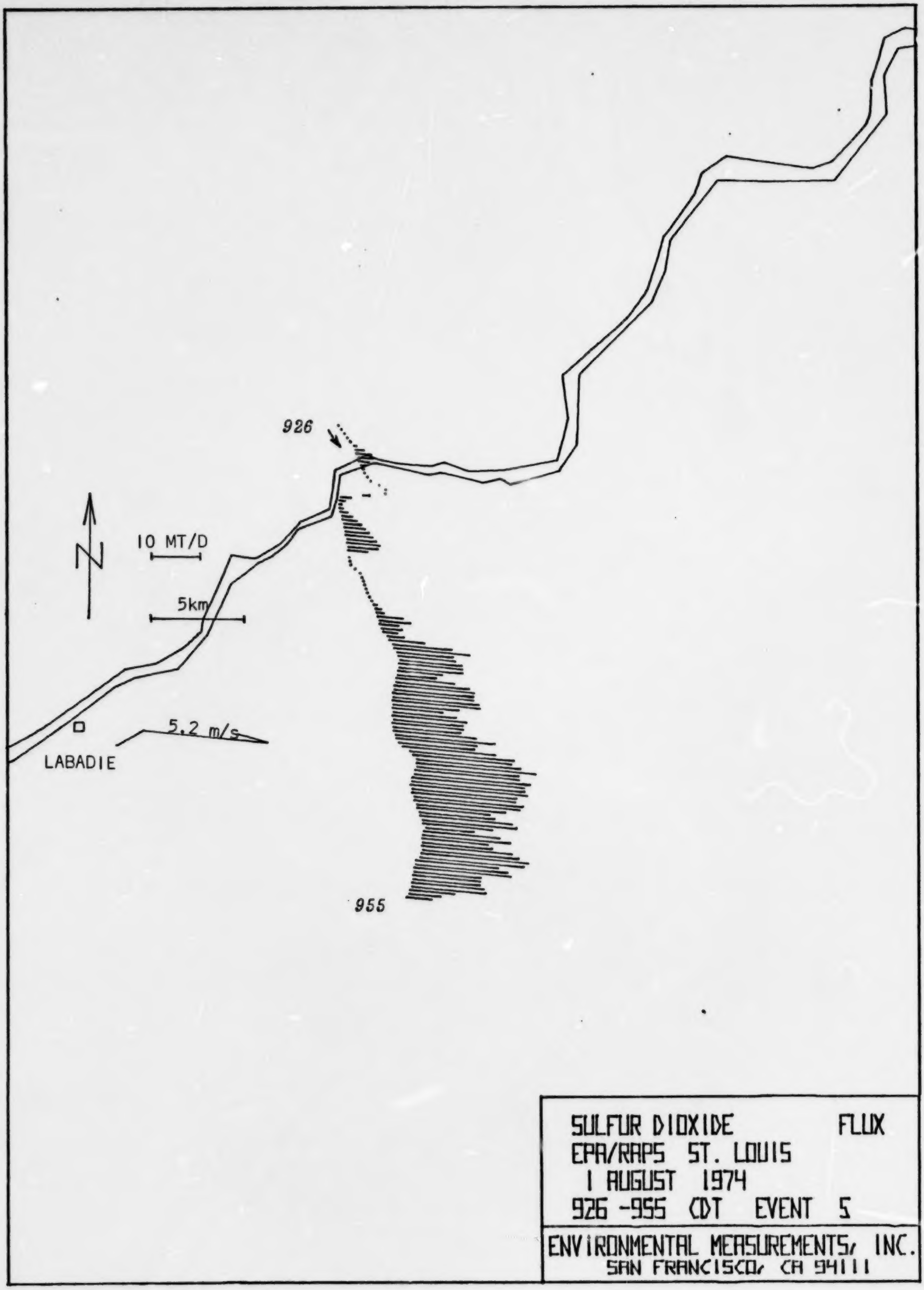
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
1 AUGUST 1974
823 -904 CDT EVENTS 2 -3

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


925
10 MT/D
N
5km
5.2 m/s
LABADIE
905

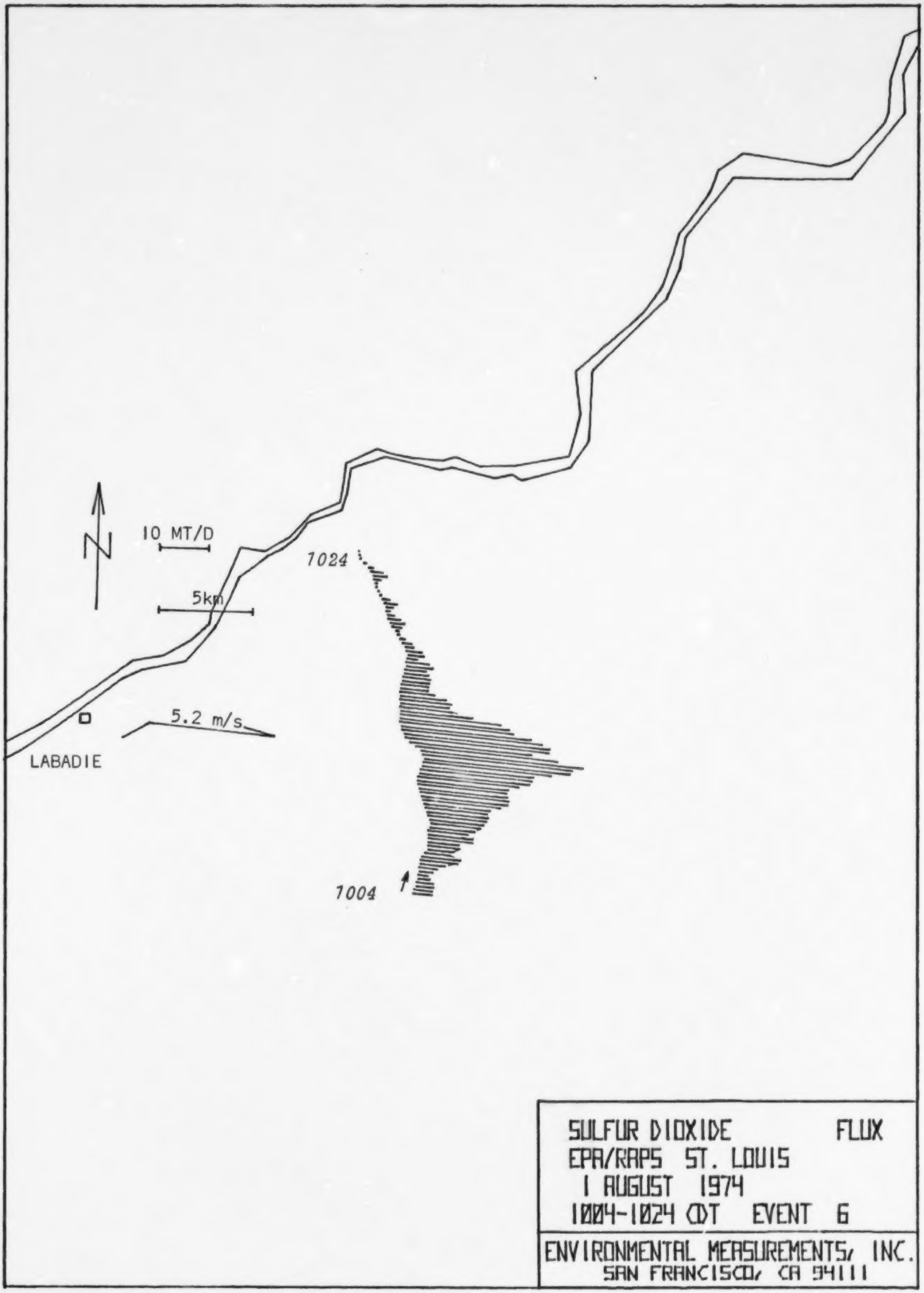
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
1 AUGUST 1974
905 -925 CDT EVENT 4

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


926
N
10 MT/D
5km
5.2 m/s
LABADIE
955

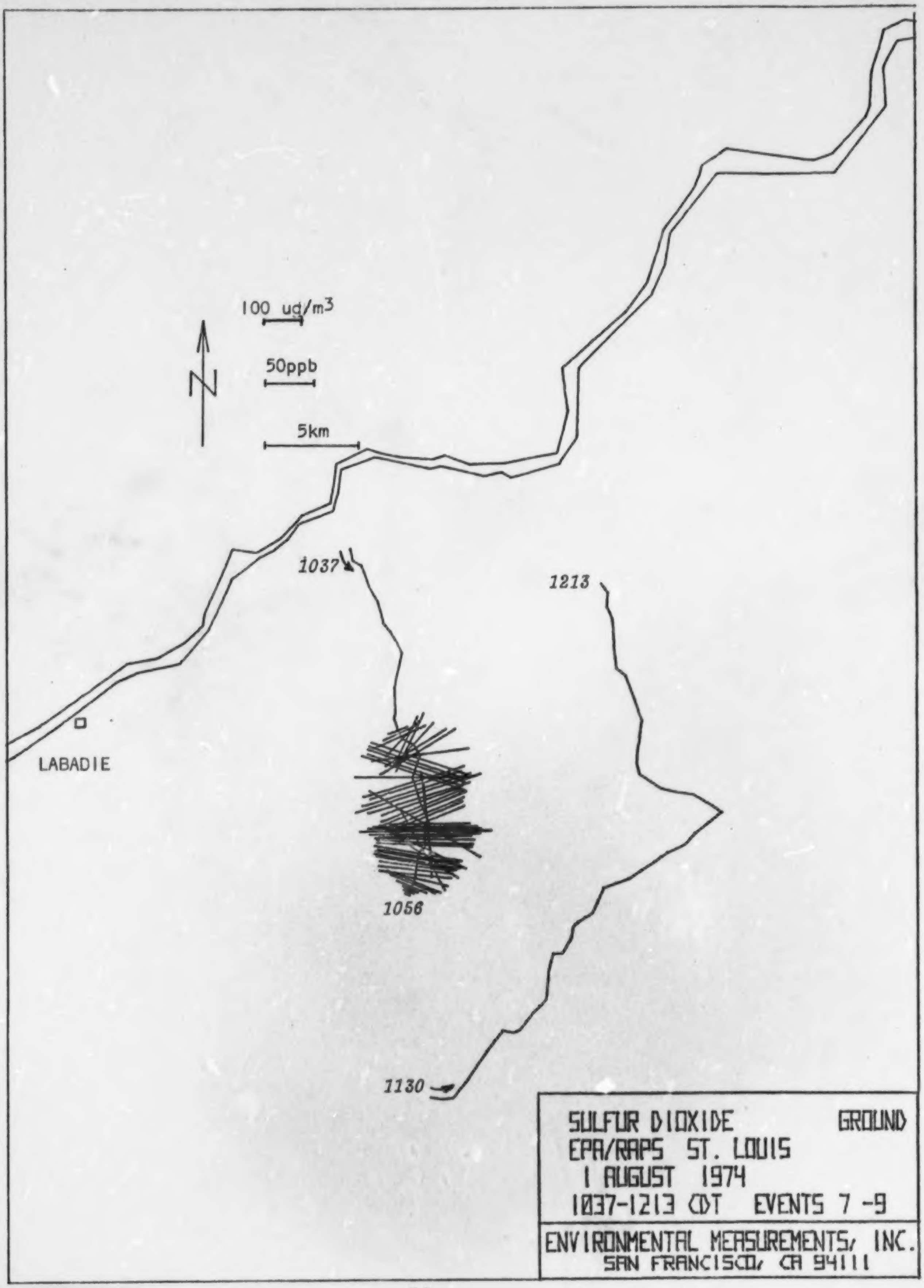
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
1 AUGUST 1974
926 -955 CDT EVENT 5

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


N
10 MT/D
5km
5.2 m/s
LABADIE
1024
1004

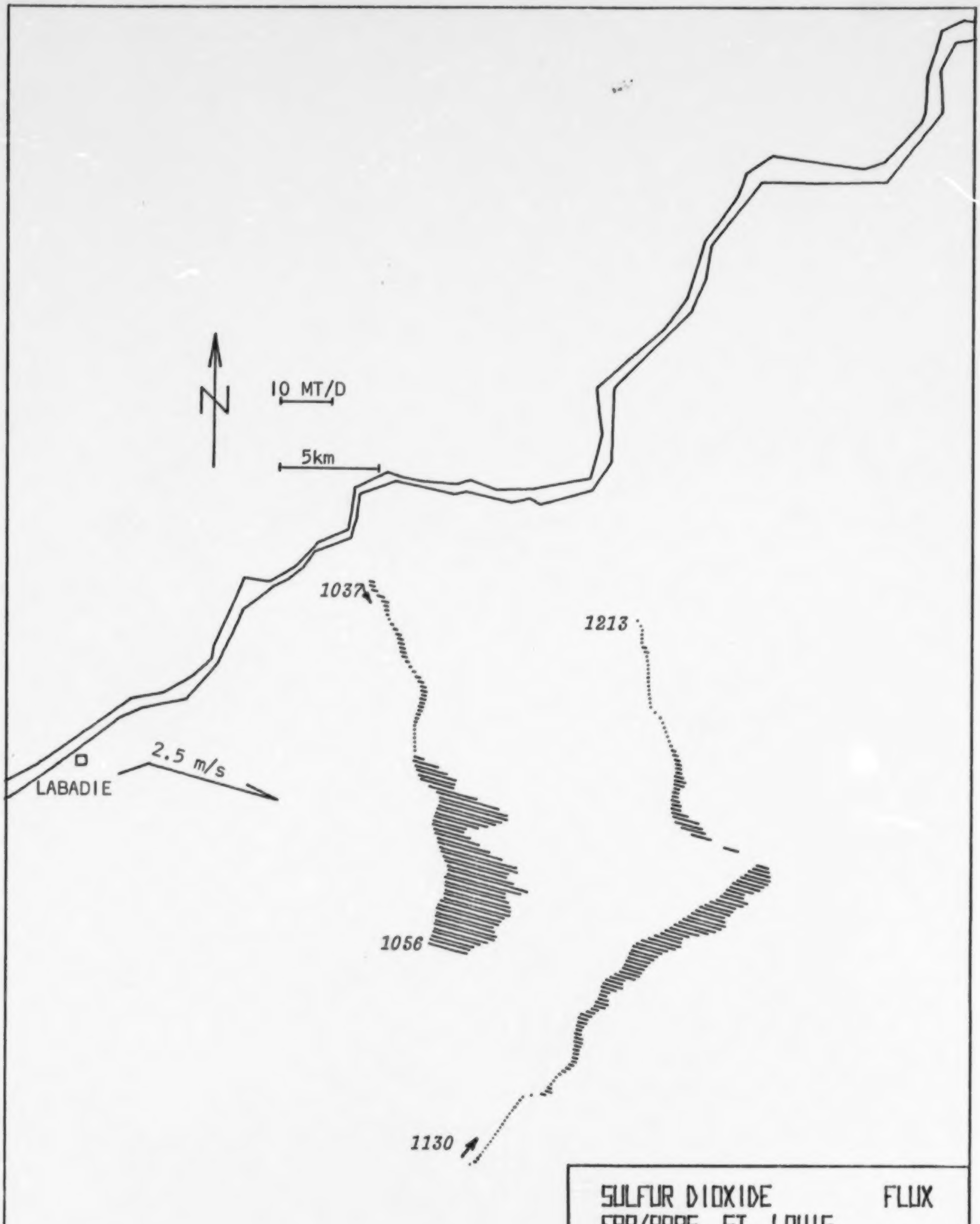
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1004-1024 CDT EVENT 6

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


N
100 ug/m3
50ppb
5km
1037
1213
LABADIE
1056
1130

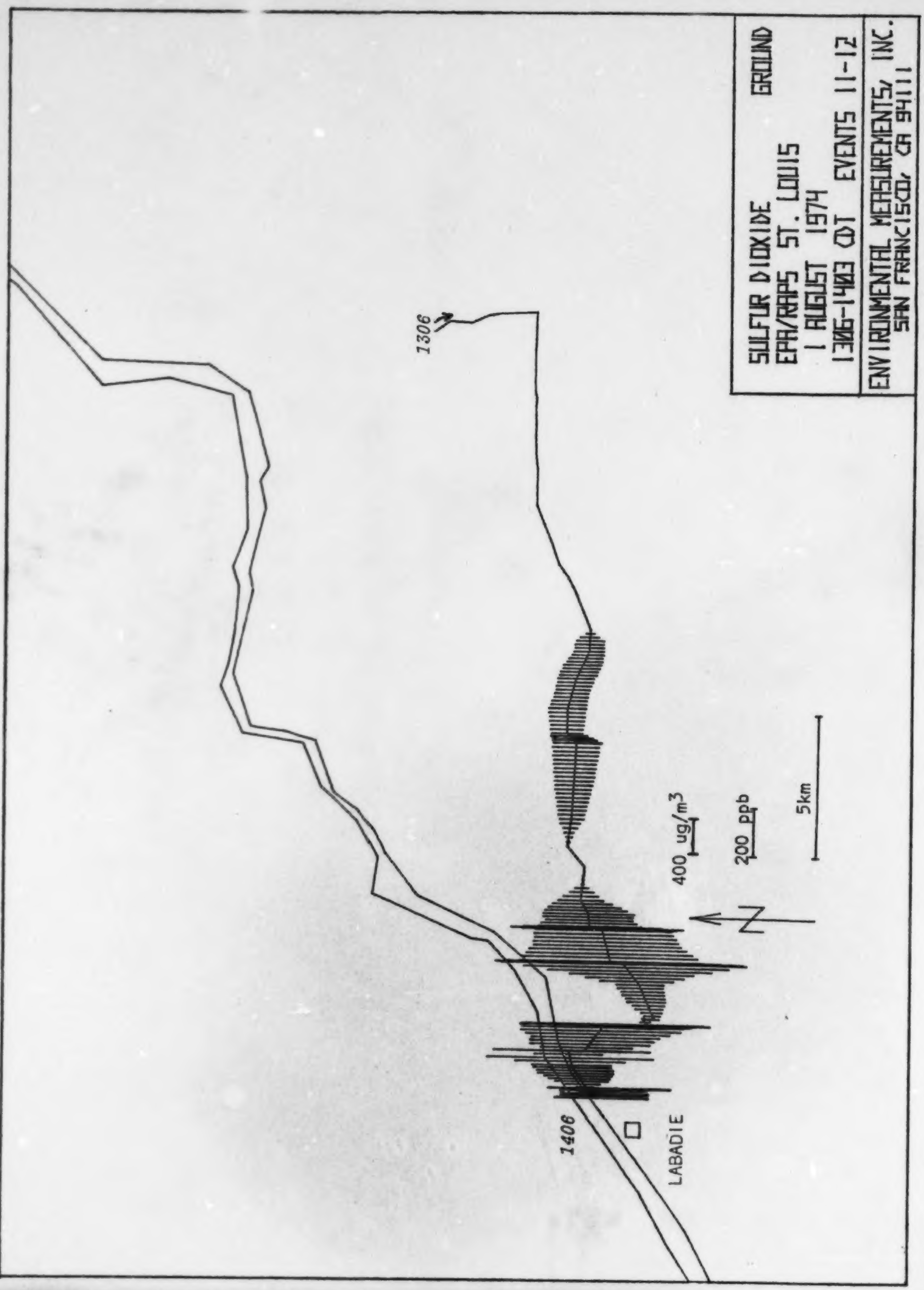
SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1037-1213 CDT EVENTS 7 -9

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

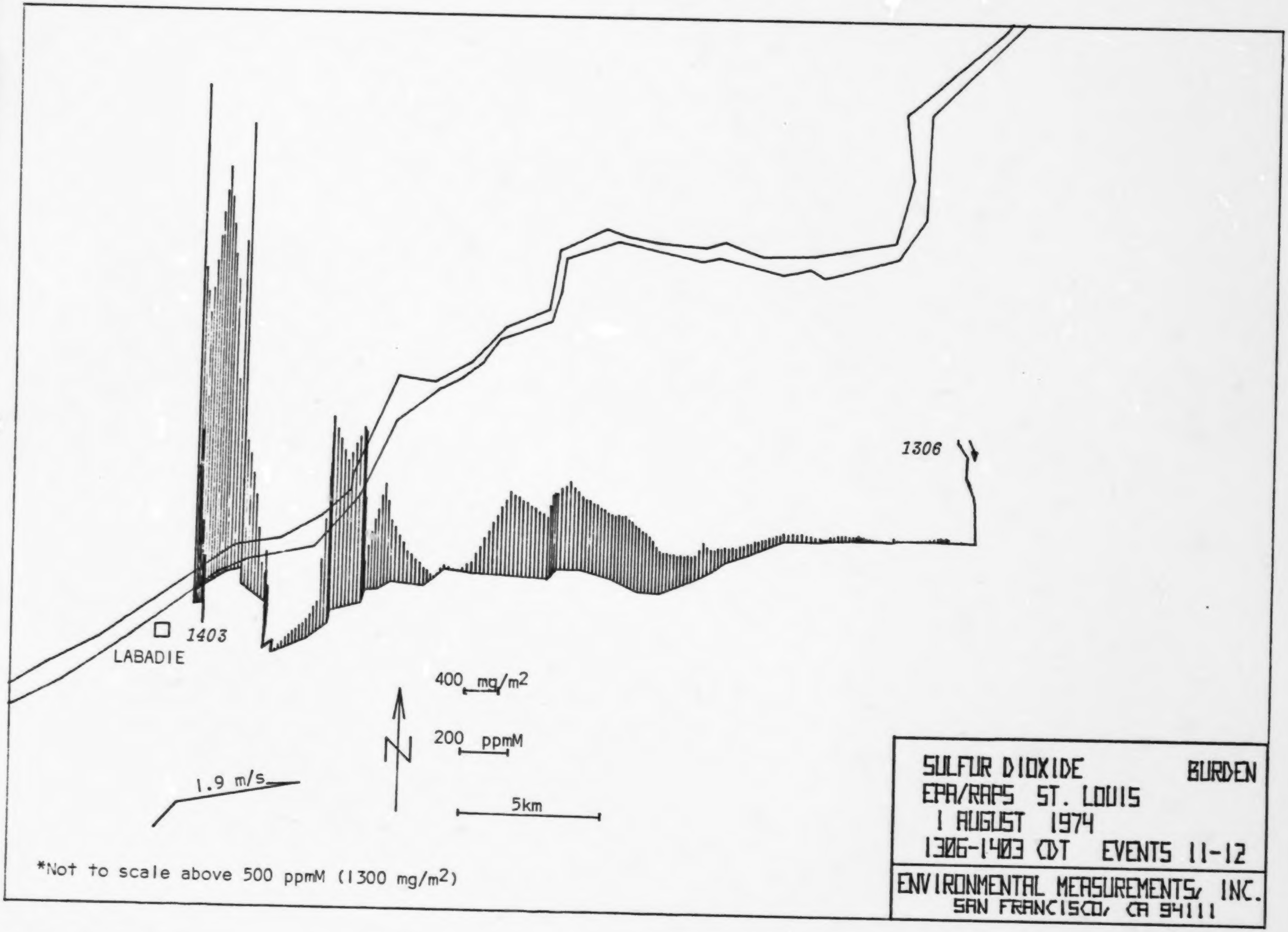

10 MT/D
5km
LABADIE
2.5 m/s
1037
1213
1056
1130

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1037-1213 CDT EVENTS 7 -9

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

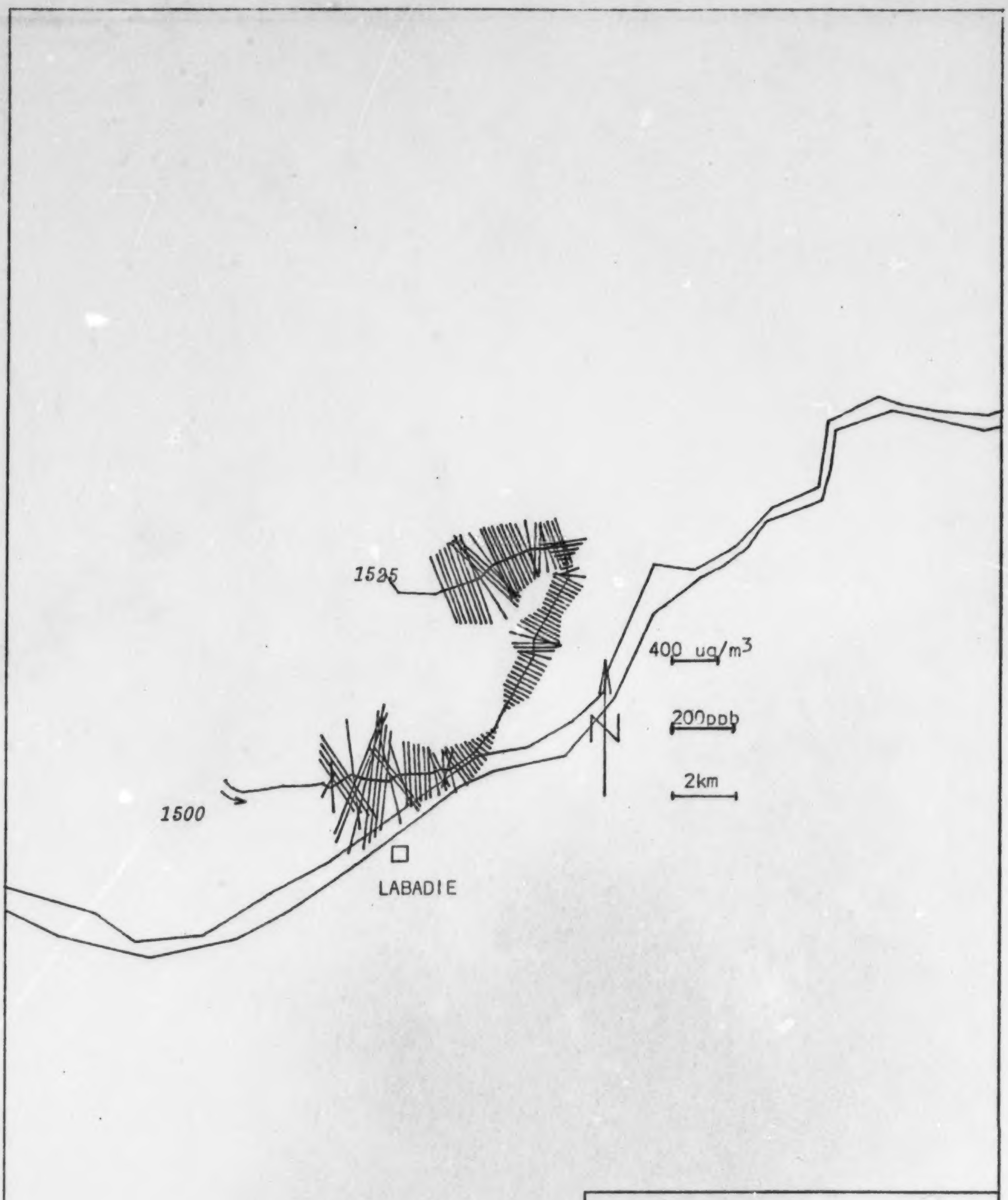

1306
1406
LABADIE
400 ug/m^3
200 ppb
5km
N

SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1306-1403 CDT EVENTS 11-12
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111


1306
1403
LABADIE
400 mg/m2
200 ppmM
5km
1.9 m/s

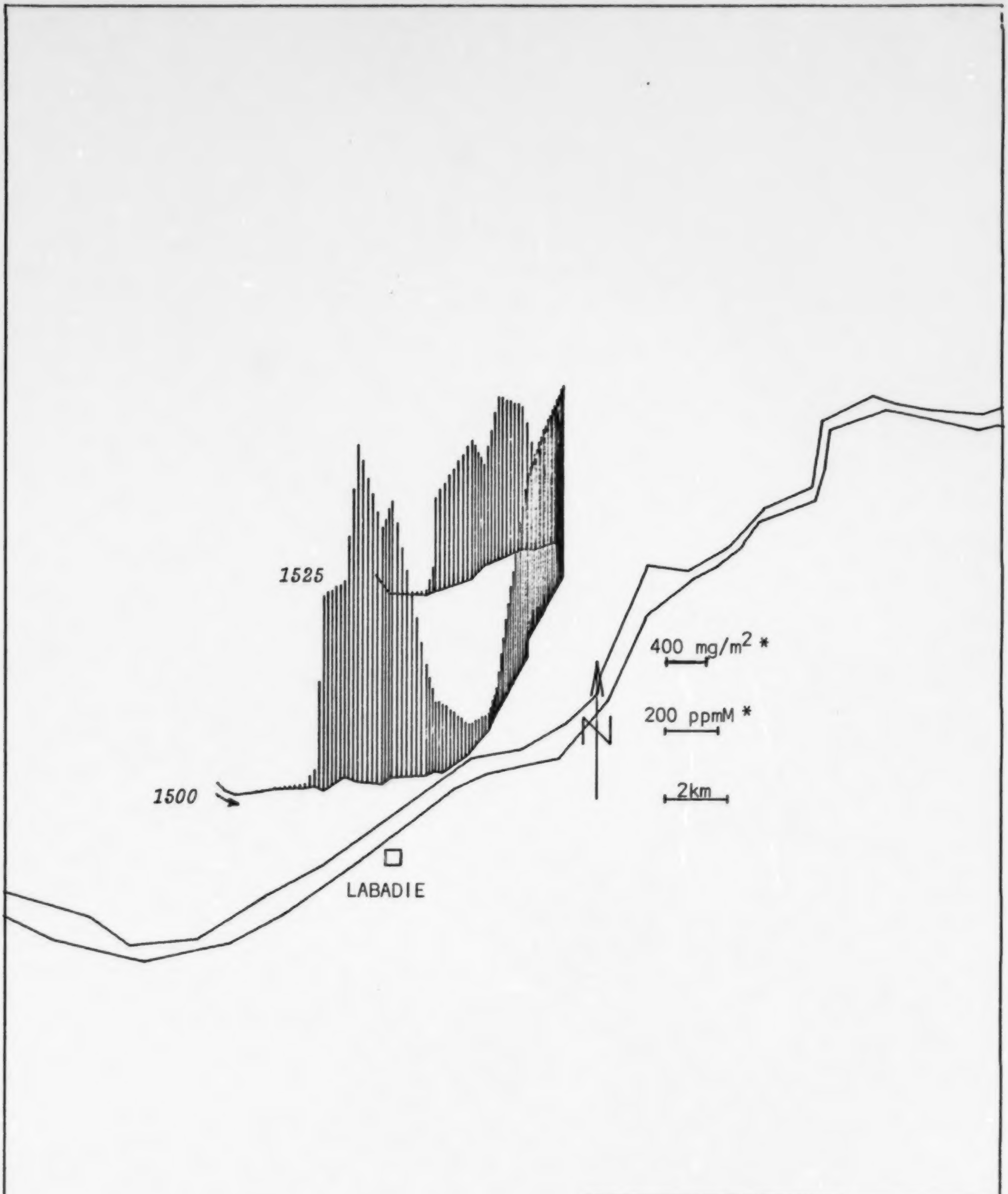
SULFUR DIOXIDE BURDEN
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1306-1403 CDT EVENTS 11-12
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

*Not to scale above 500 ppmM (1300 mg/m^2)


1525
1500
LABADIE
400 ug/m3
200ppb
2km
N

SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1500-1525 CDT EVENTS 15-16

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111



1525
1500
400 mg/m² *
200 ppmM *
2km
N
LABADIE

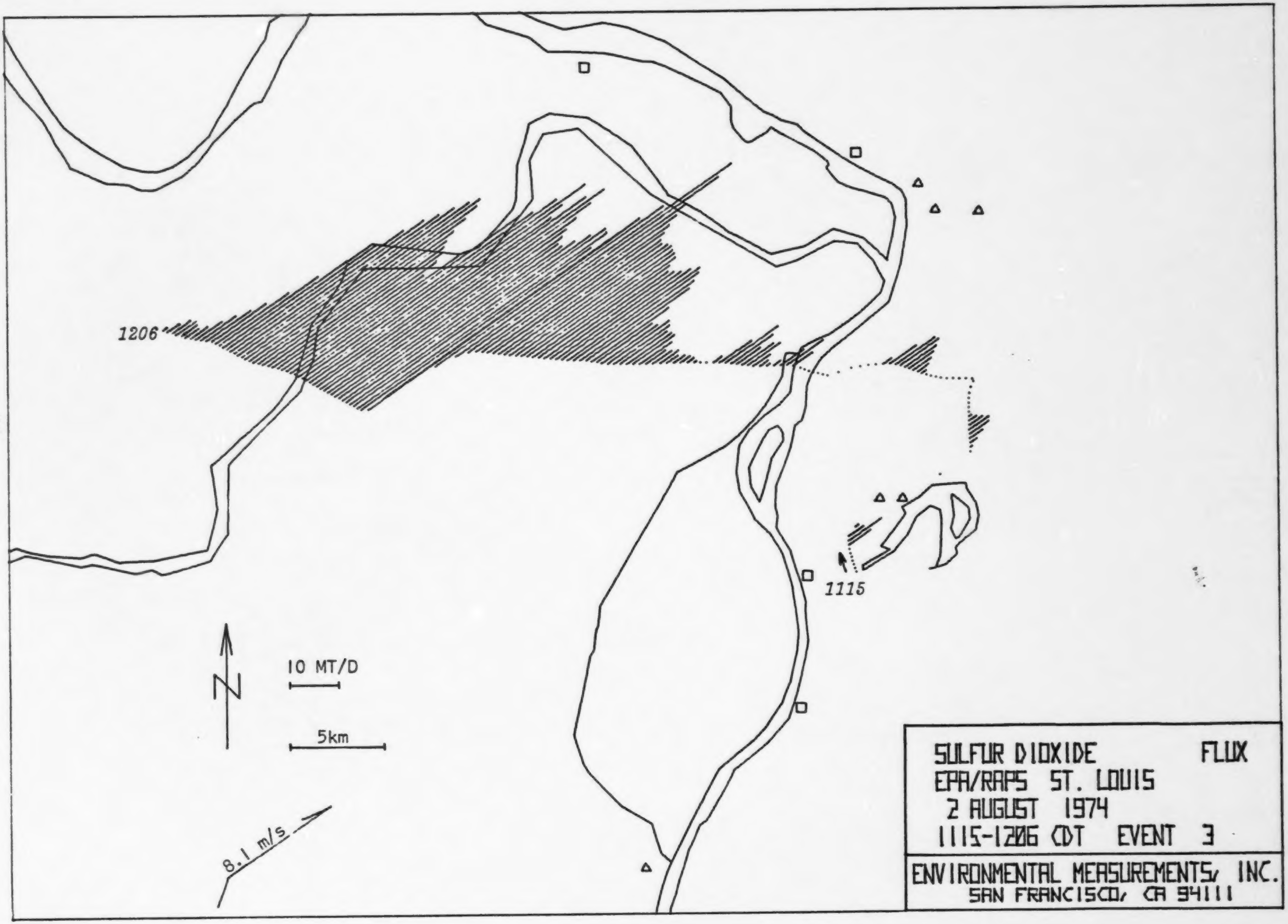
*Not to scale above 500 ppmM (1300 mg/m^2)

SULFUR DIOXIDE BURDEN
EPA/RAPS ST. LOUIS
1 AUGUST 1974
1500-1525 CDT EVENTS 15-16

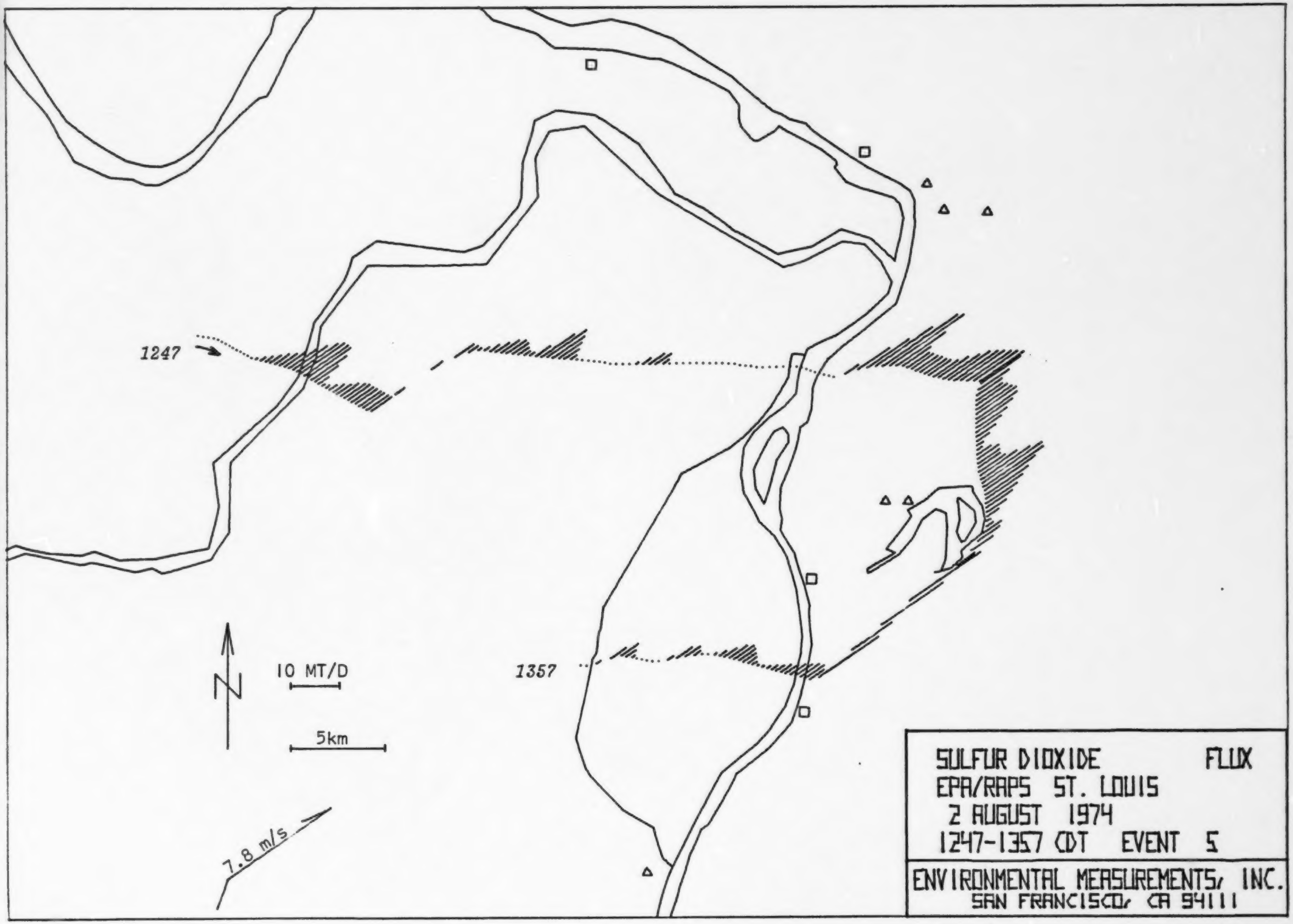
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

2 August 74 - Urban Plume

Events 3,5 - Two mid-day regional plume surveys using I-270 as the principal route yielded markedly different flux maps. The broad plume apparent in the late morning came from the direction of Labadie (off map to left). It is likely that this plume was trapped aloft by light winds which changed direction between the two traverses, since the plume was not present in the early afternoon. Pibal data below 1000 feet indicate almost constant winds during this interval, however.


1206
1115
10 MT/D
5km
8.1 m/s

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
2 AUGUST 1974
1115-1206 CDT EVENT 3
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111



1247
1357
N
10 MT/D
5km
7.8 m/s

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
2 AUGUST 1974
1247-1357 CDT EVENT 5

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

3 August 74 - Urban Plume

Event 3 - On the early morning traverse the COSPEC detected two major plumes; the southerly one was from the Portage des Sioux Power Plant and the northerly one was the Wood River Complex (the power plant mixed with industrial sources). Ground-level SO_2 (to 595 ppb peak) was greater for the northern plume because the sources were nearer.

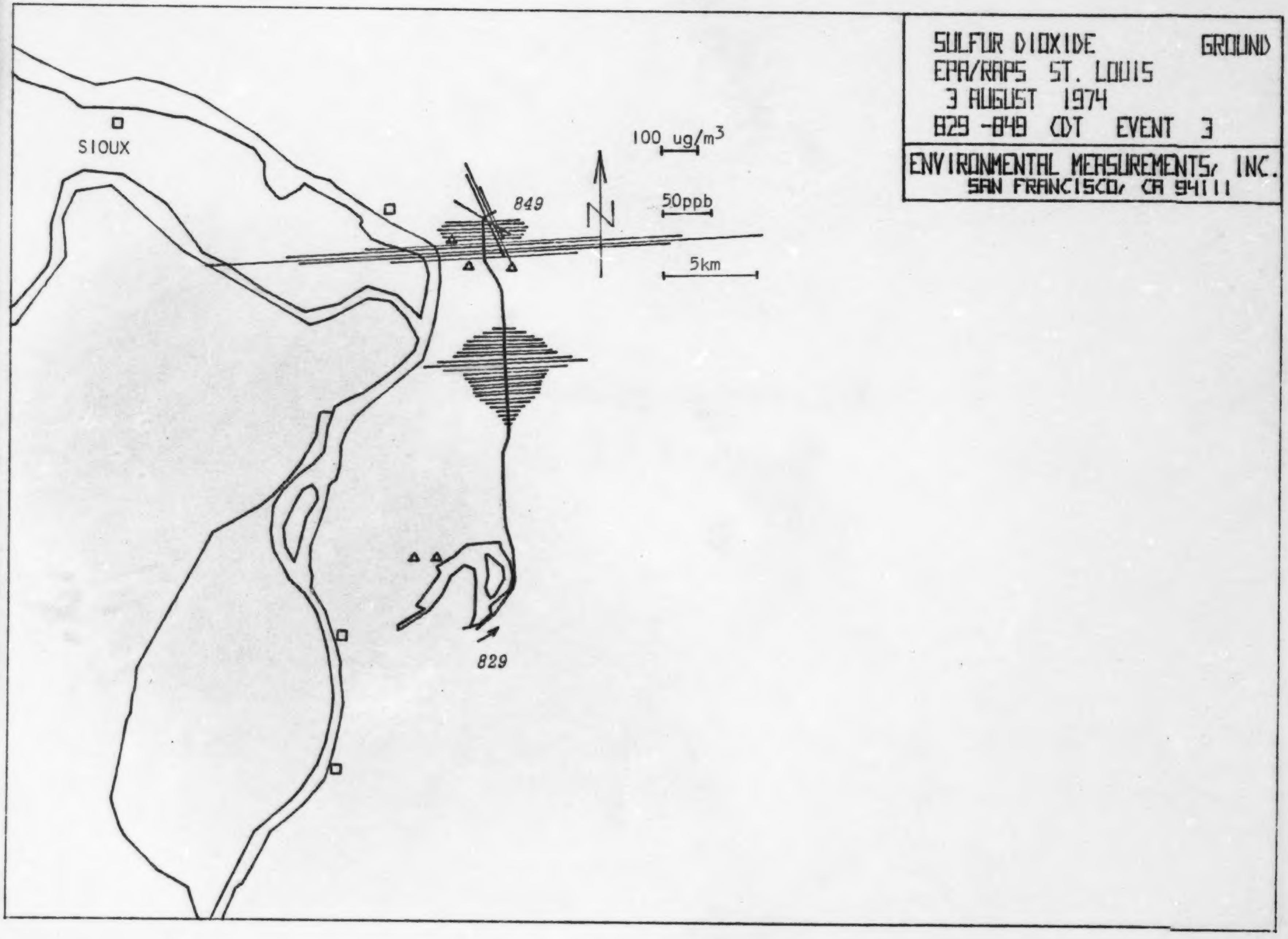
Event 5-8 - Wind rotation mixed the two plumes on the return traverse: no significant plumes were encountered on the far southern loop. Upon returning north the two plumes reappeared further to the north after the wind had rotated (as indicated by the upper wind arrow). Touchdown for the combined plumes reached 1120 ppb SO_2 maximum.

Events 10,11- Pursuing the prominent plumes downwind the survey extended to 43 km from Portage des Sioux. Touchdown was detected at this distance.

Events 12-17- Event 12 repeated the plume crossings of Event 11; the urban plume was measured 70 km from the Gateway Arch. No touchdown was associated with the broad, diffuse urban plume.

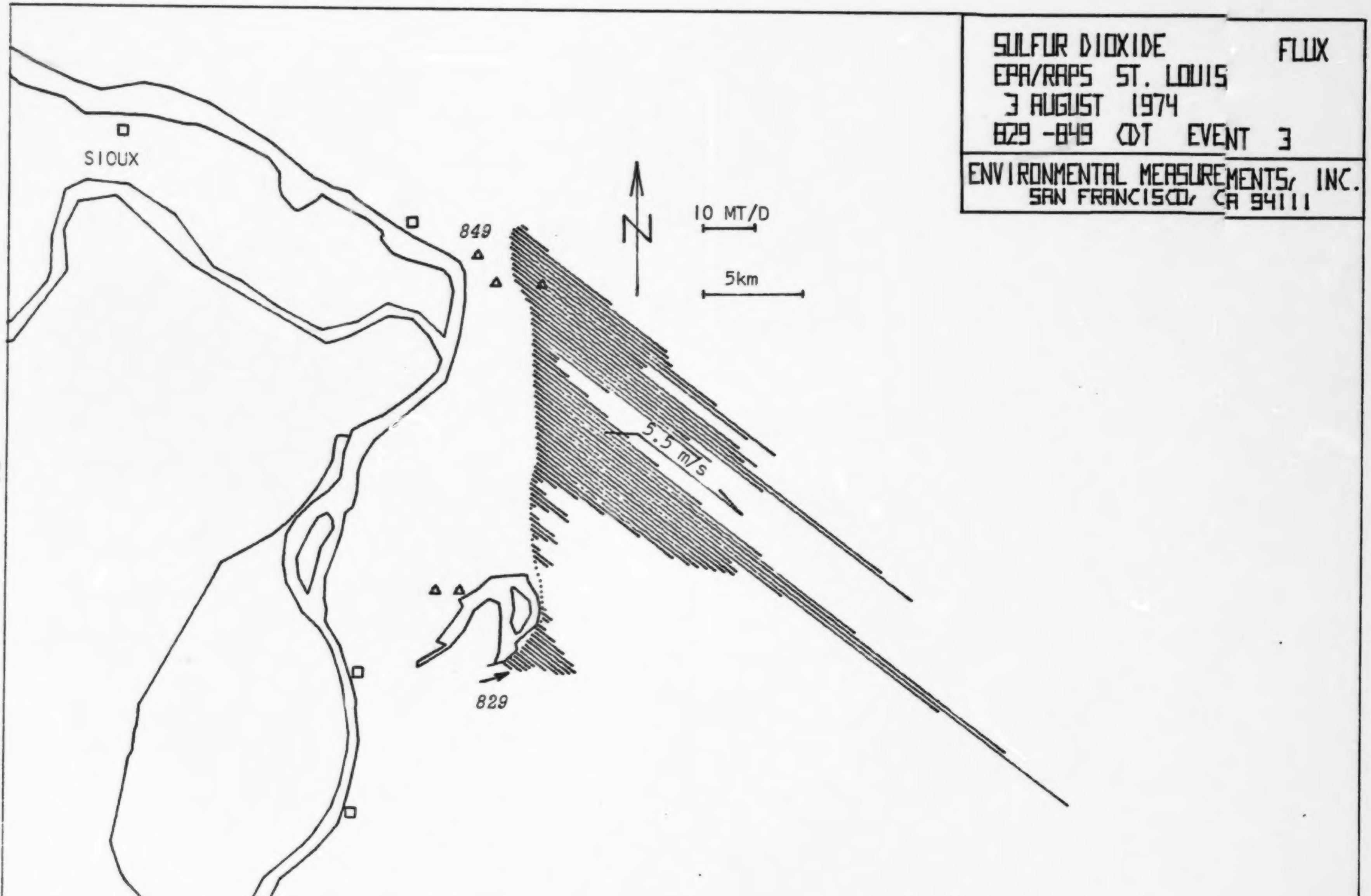
Events 18-22- The urban plume was not completely crossed but a portion of it was measured twice (Events 17 and 18). Returning to the close-in traverse routes the Portage des Sioux plume was again detected in the same location as the late morning measurements.

While the Urban Plume was the assigned mission for 3 Aug 74 one of the main survey targets observed was the Portage des Sioux plume. It was detected 7 times throughout the day.


SIOUX
100 ug/m3
N
50ppb
5km
849
829

SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
3 AUGUST 1974
829 -849 CDT EVENT 3

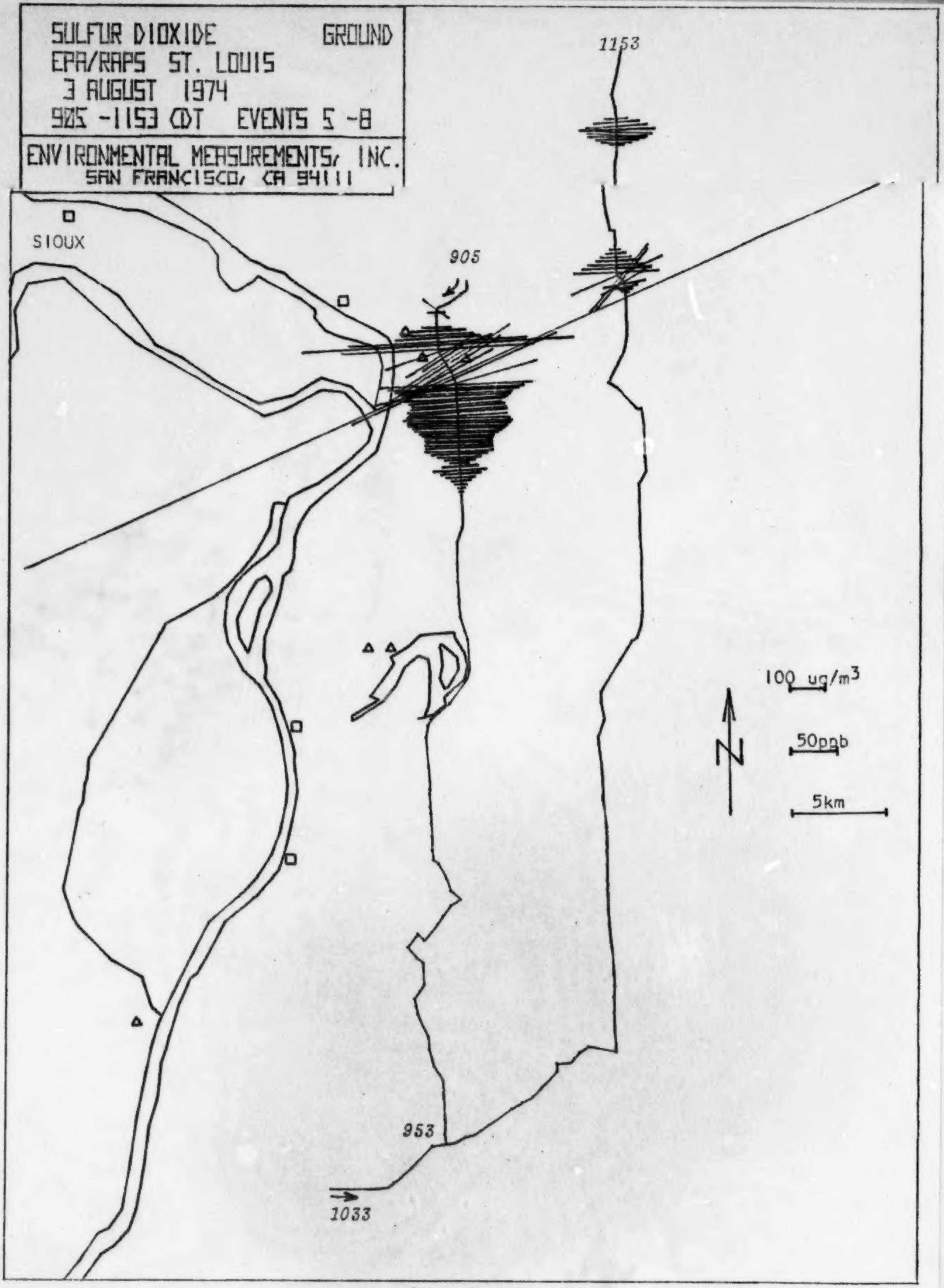
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

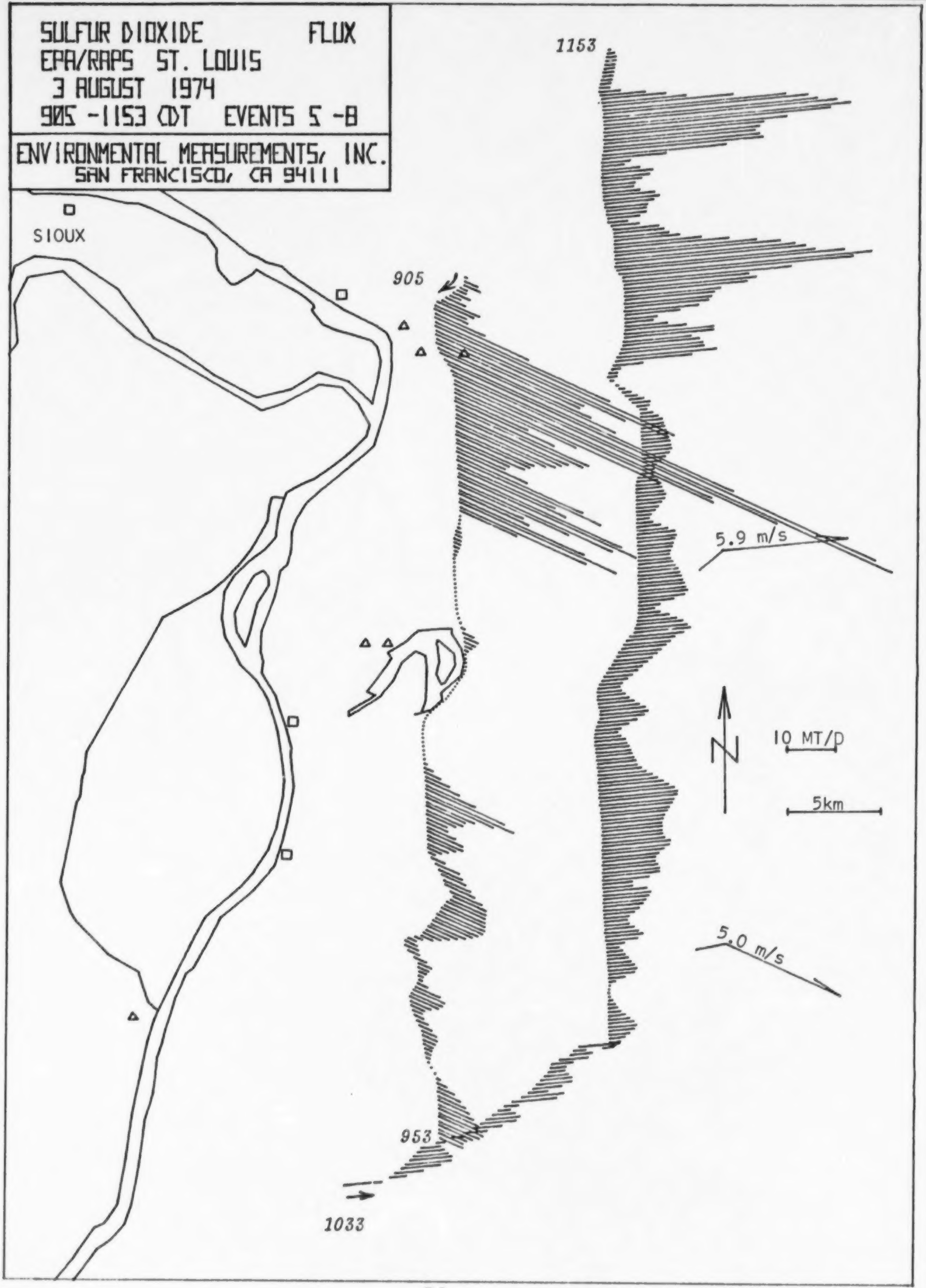


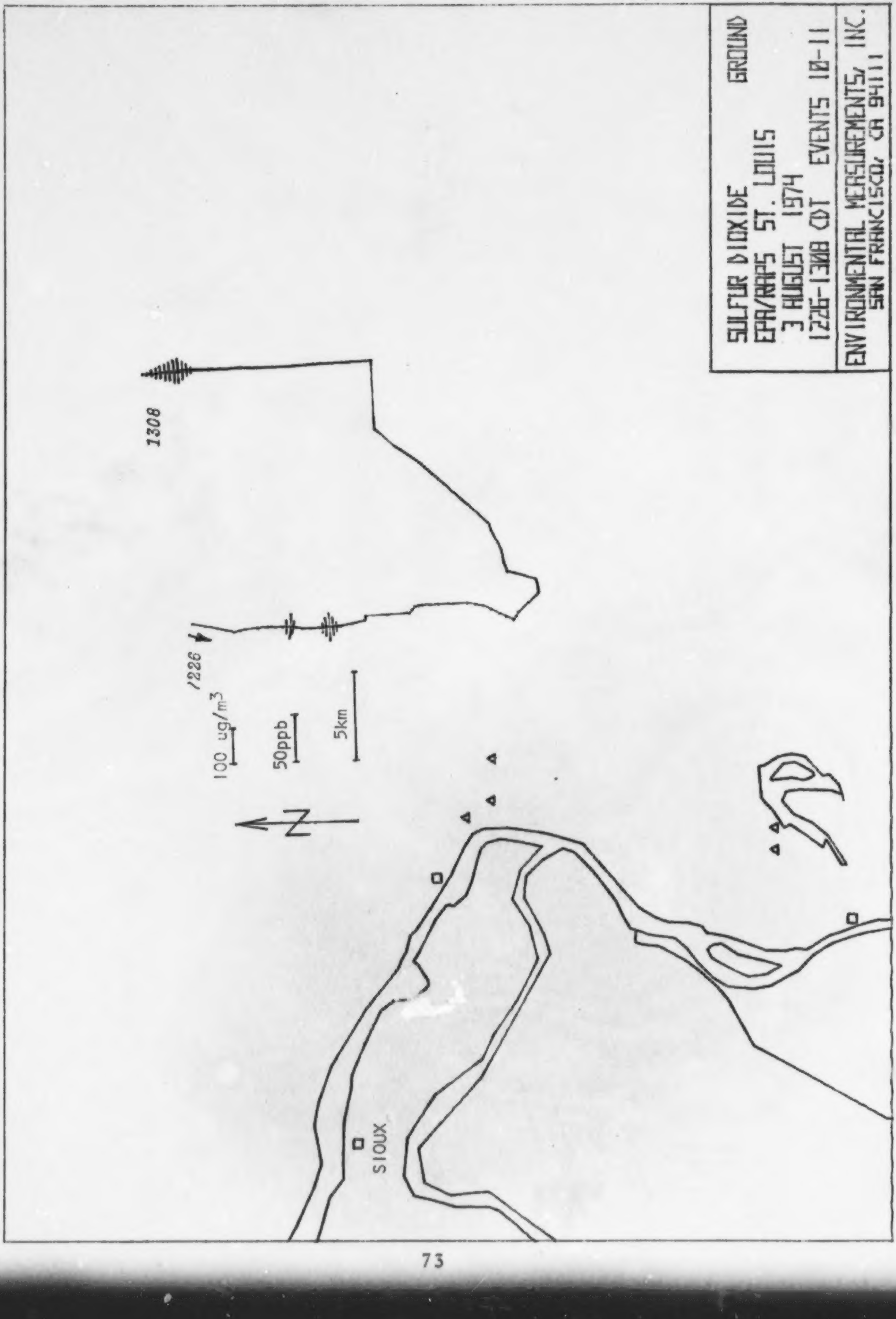
SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
3 AUGUST 1974
829 -849 CDT EVENT 3

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

SIOUX
849
829
10 MT/D
5km
5.5 m/s
N

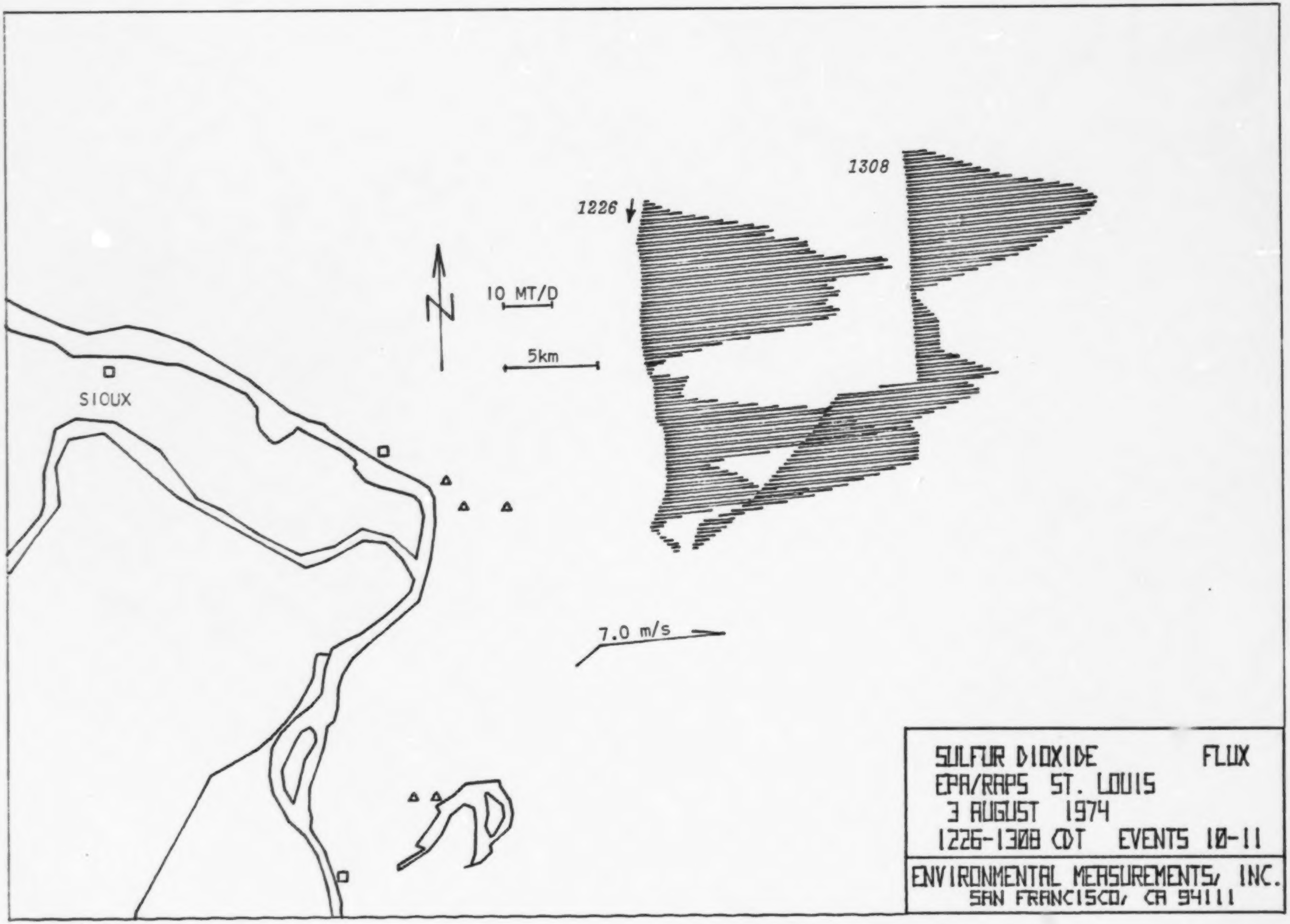

SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
3 AUGUST 1974
905 -1153 CDT EVENTS 5 -8
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111
1153
SIOUX
905
100 ug/m3
N
50ppb
5km
953
1033


SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
3 AUGUST 1974
905 -1153 CDT EVENTS 5 -8
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111
SIOUX
1153
905
5.9 m/s
N
10 MT/D
5km
5.0 m/s
953
1033

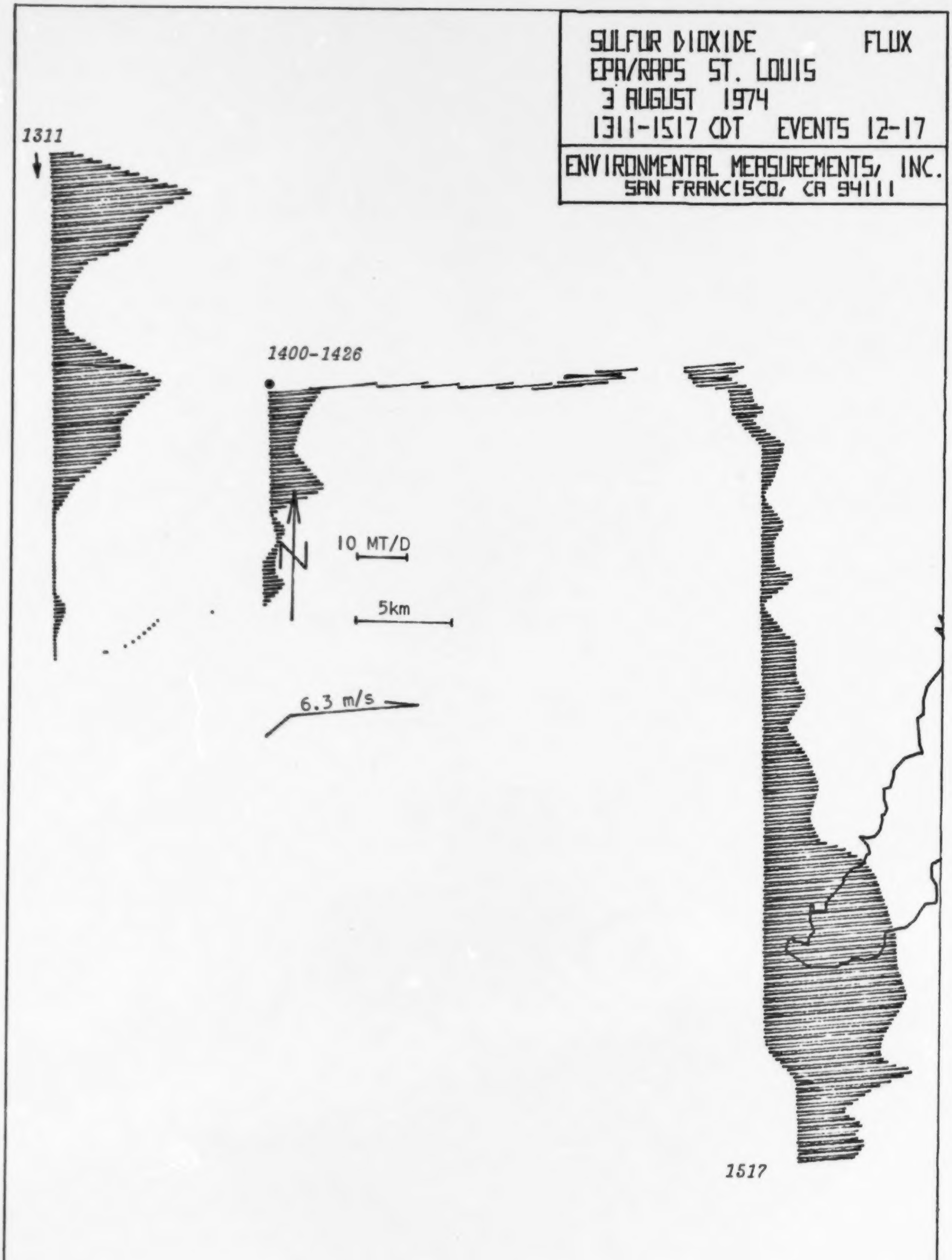


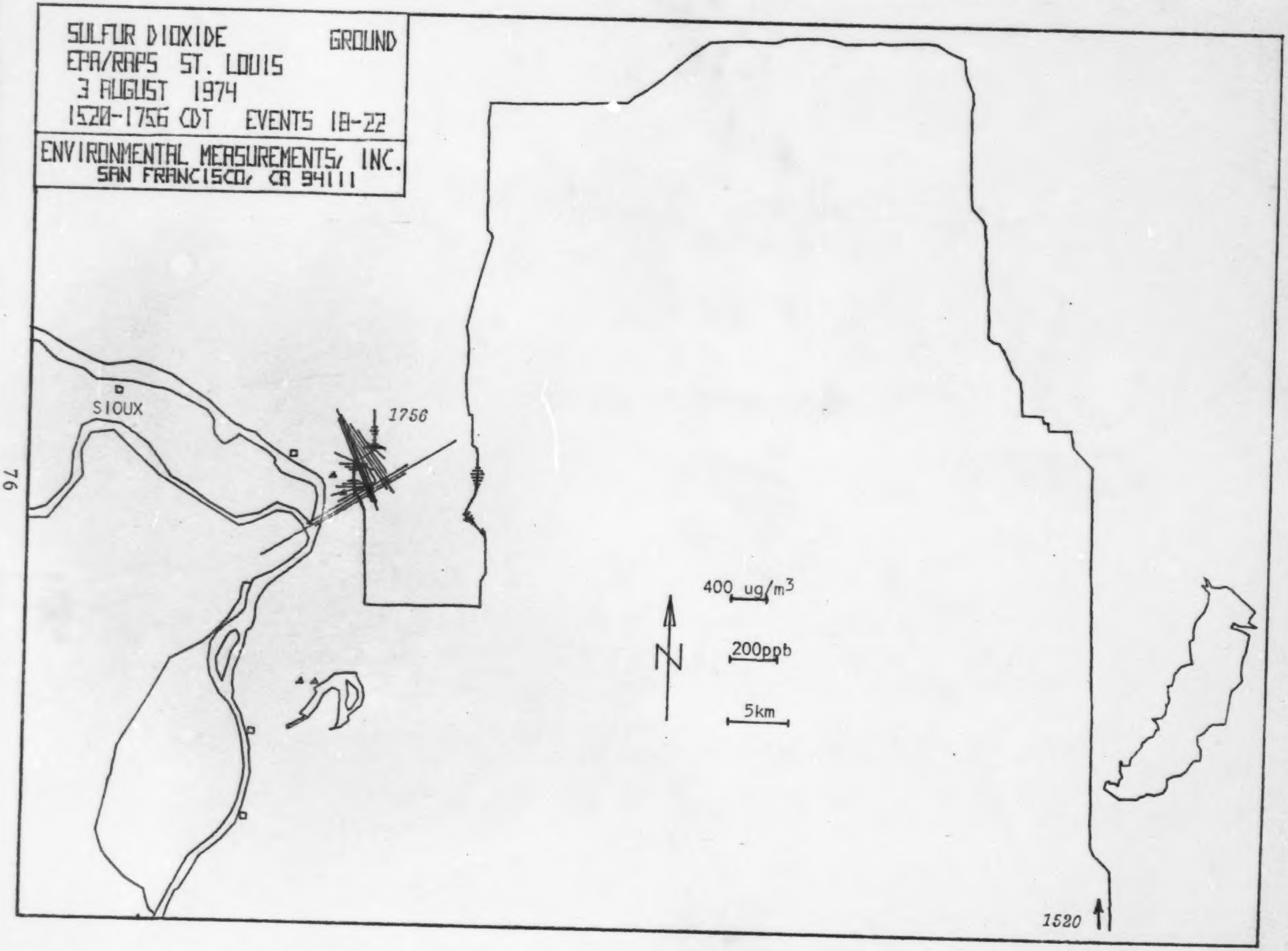
SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
3 AUGUST 1974
1226-1308 CDT EVENTS 10-11
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

1308
1226
100 ug/m^3
50ppb
5km
N
SIOUX


1226
1308
10 MT/D
5km
7.0 m/s
SIOUX

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
3 AUGUST 1974
1226-1308 CDT EVENTS 10-11
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

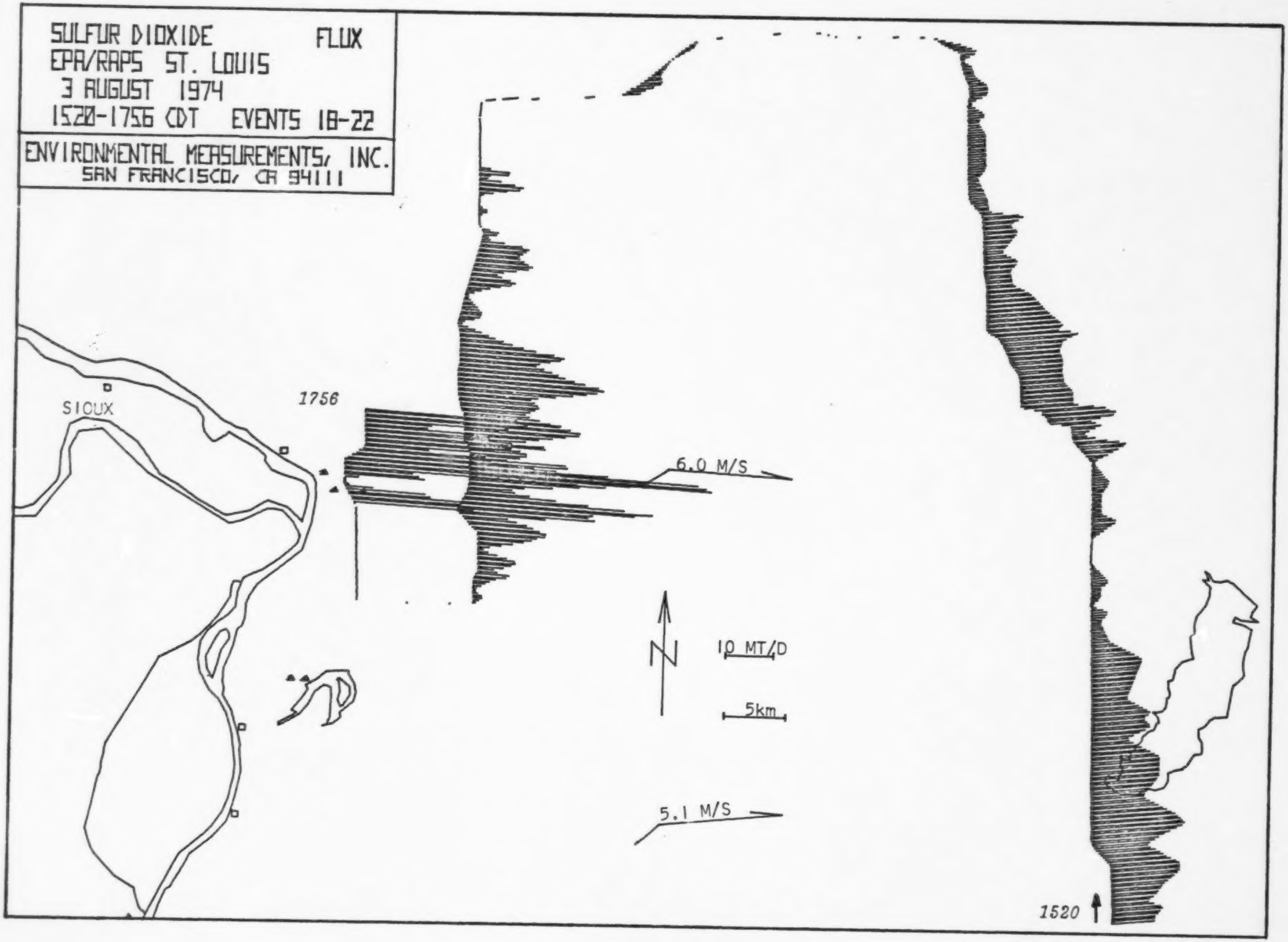

SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
3 AUGUST 1974
1311-1517 CDT EVENTS 12-17
ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111
1311
1400-1426
N
10 MT/D
5km
6.3 m/s
1517



SULFUR DIOXIDE GROUND
EPA/RAPS ST. LOUIS
3 AUGUST 1974
1520-1756 CDT EVENTS 18-22

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

SIOUX
1756
1520
N
400 ug/m3
200ppb
5km



SULFUR DIOXIDE FLUX
EPA/RAPS ST. LOUIS
3 AUGUST 1974
1520-1756 CDT EVENTS 18-22

ENVIRONMENTAL MEASUREMENTS, INC.
SAN FRANCISCO, CA 94111

SIOUX
1756
6.0 M/S
10 MT/D
5km
5.1 M/S
1520

Section 5

ANALYSIS

A limited analysis of the Flux Maps in Section 4 has been made to help interpret the results of the EMI measurements in St. Louis and to suggest further uses for the AQML data. There are two elements in this analysis: plume flux and plume geometry.

PLUME FLUX

A total of 45 computerized plume flux calculations--SO_2 emission rates measured by the COSPEC remote sensor--have been analyzed for three major sources. Most of the SO_2 Fluxes are for the Labadie Power Plant (32); SO_2 emissions rates were quantified fewer times for the Portage des Sioux Power Plant and the Wood River Complex (six each). The results of this analysis are listed in Tables IV and V. The dates, event numbers, time, wind speed used in the flux calculation, evidence of plume touchdown, the distance from the source and the SO_2 Flux in metric tons per day (MT/D) are tabulated for all sources.

Labadie. The Labadie Plume SO_2 Flux (Table IV) was quantified on three days, 29, 31 July and 1 Aug. The major findings from this table are:

- 29 Jul 74: The average of 10 SO_2 Flux determinations for Labadie is 1650 MT/D. This compares to a reported 1000-1200 MT/D SO_2 emission rate for this plant, obtained from EPA Region VII. No plume touchdown was recorded.

Table IV

SO_2 FLUX

Labadie Plume

DATE	EVENT	TIME (CDT)	WIND (M/S)	TOUCH-DOWN	DISTANCE (KM)	SO_2 FLUX (MT/D)
29 Jul 74	5	1436-1445	4.9	NO	7.5	2009
	7	1457-1500	4.9	NO	2.6	2028
	8	1501-1506	5.5	NO	2.6	2200*
	9	1506-1511	5.5	NO	2.6	2100*
	11	1518-1521	5.5	NO	1.5	1600*
	13	1528-1532	6.1	NO	1.3	1500*
	15.01	1538-1547	6.1	NO	2.6	1200*
	15.02	1548-1553	6.1	NO	7.7	1208*
	17	1616-1624	6.1	NO	10.6	965
31 Jul 74	5	0905-0920	1.8	NO	9.2	354
	6	0928-0941	1.7	NO	25.3	281
	7	0941-0956	1.3	NO	17.2	326
	8	0957-1008	1.4	NO	17.0	408
	10	1021-1031	1.5	NO	17.2	691
	11	1032-1041	1.5	NO	17.5	716
	13	1052-1104	1.5	NO	22.4	611
	14	1105-1115	1.4	NO	22.4	551
	15	1115-1132	1.5	NO	28.9	647
	16	1132-1145	1.6	NO	29.2	511
	17	1152-1207	1.6	YES	28.9	259
	19	1300-1312	1.6	YES	33.8	268
	20	1318-1334	2.2	YES	34.8	340
	21	1342-1349	2.5	YES	34.8	179
	22	1349-1400	2.8	YES	45.2	319
	23	1435-1501	3.0	YES	43.3	457
1 Aug 74	2	0823-0843	6.9	NO	26.3	494
	3	0846-0904	6.9	NO	17.0	1109
	4	0905-0925	5.2	NO	17.0	927
	5	0926-0936	5.2	NO	17.8	1176
	6	1004-1024	5.2	NO	18.0	878
	7	1037-1056	2.5	YES	18.8	478
	9	1130-1213	2.5	YES	32.2	276

*Estimated Flux; Peak SO_2 Burdens exceed calibration range of remote sensor.

- 31 Jul 74: SO_2 Flux was determined before and after plume touchdown. The average Flux before touchdown (10 calculations): 510 MT/D; after touchdown (6 calculations): 304 MT/D.
- 1 Aug 74: The Labadie plume was monitored again before touchdown; 917 MT/D SO_2, five calculations; and after: 377 MT/D SO_2, two calculations.

Five of the 29 July emission calculations (identified by asterisks) were derived from SO_2 Burden measurements which exceeded the calibration range of the COSPEC. This occurred because the data were gathered close to this large source; peak SO_2 Burdens were greater than 3000 ppmM. While it is still possible to estimate the SO_2 Flux from these data the results are less accurate. Further work is required to calibrate the correlation disk for near source, high Burden plume flux measurements.

The average SO_2 emissions for Labadie varied for the three days; 1650, 510 and 917 MT/D. The differences between days--and between periods of each day--may indicate changes in operation of the power plant; they may reflect the accuracy of the flux calculations.

There are two possible sources of COSPEC error in these mass flux determinations. Close to the source the plume is a visible dense cloud. The particulate matter has the potential of scattering or blocking light to the spectrometer, while further downwind the barely visible plume has no such effect. In addition, fluxes for the close-in traverses are derived from large COSPEC signals which can be six times greater than the sum of the calibration cells. When extrapolating beyond the linear range of the 87-505 ppmM SO_2 calibration cells the non-linear instrument response must be taken into consideration. These errors would be most noticeable when comparing computations from near and far traverses. However, these factors are understood and are accounted for.

Care is taken during field measurements to monitor spectrometer light throughput by observing the COSPEC's AGC voltage during near-source plume crossings; this virtually eliminates the chance of error due to light attenuation. The nonlinearity is corrected for in flux calculations where the SO_2 Total Burdens exceed 500 ppmM, using a calibration curve developed by EMI and Barringer Research Ltd. Less control was exercised over the meteorological data gathered in St. Louis.

Wind speeds were extrapolated from hourly pibal soundings taken as far as 30 km away. The data from these soundings were only preliminary RAPS data; the necessary RAPS quality control had not been applied. Any intensive analysis of the fluxes reported here must account for the fact that these meteorological observations also were distant from the moving laboratory's "instantaneous" observations--in both space and time. With fewer data points to choose from errors in the wind speed tend to have a greater influence on the flux calculation than errors in Burden measurements. This observation agrees with analyses previously reported by Jepsen and Weil (paper #73-157 presented at the APCA Annual Meeting, June 1973). Only by making a wind measurement simultaneously with each plume crossing could the true error contributions be evaluated.

Bearing these limitations in mind, the COSPEC Flux calculations can be examined to better understand plume dispersion phenomena. The reduction of SO_2 flux following plume touchdown is especially interesting. On 31 July the reduction was 40%; for 1 August, 59%. From these limited results it can be postulated that on the order of 50% of the SO_2 contained in the Labadie plume was "lost" after the plume touched the ground.

Some of the reduced mass flux can be attributed to measurement and analysis methods. The COSPEC is mounted in the AQML so that it views the overhead sky from 1.5 meters above the surface; a low lying plume could be only partially measured because the remote sensor misses the lowest 1.5 meters of gas. Plume touchdown was usually found to occur 30 kilometers or more from the plant where the plume was broad and diffuse; the accuracy of the flux calculations from such data tends to be less than for nearer, more sharply defined plumes. Once touchdown has occurred the SO_2 in the plume is being transported by a wider range of wind velocities, from the surface to the upper limits of the plume. From this complex wind profile a single wind speed must be chosen for calculating mass flux. An "average" wind speed usually must suffice. If the lower altitude winds are faster than those at higher altitudes, the flux calculation will tend to be low, unless the detailed data can be incorporated into the calculation. If the lower altitude winds are slower, failure to accurately include them in the flux calculation will result in a higher than actual flux. Thus, there is somewhat greater uncertainty about the flux calculations after plume touchdown. Nevertheless, the results suggest that plume/surface interaction mechanisms (hypothesized by Dr. Rudolph Husar, Washington University) may remove a significant portion of the SO_2 gas from power plant plumes.

Portage des Sioux and Wood River. AQML measurements in Illinois on 3 August 74 include well defined plumes for two major sources: the Portage des Sioux Power Plant and the Wood River Complex (including the Wood River Power Plant and oil refineries). The results (Table V) are summarized as follows:

• Portage des Sioux:	The average SO_2 Flux for six calculations is 875 MT/D. This contrasts with 400-500 MT/D SO_2 reported for this plant by EPA Region VII.
• Wood River Complex:	Six plume crossings average 768 MT/D SO_2.

During the morning (Event 5) these two plumes were superimposed on the AQML's traverse route. For this one time the SO_2 emission rate of these combined sources was calculated to be 1577

Table V

SO_2 Flux

Portage des Sioux and Wood River Complex Plumes

DATE	EVENT	TIME (CDT)	WIND (M/S)	SOURCE *	TOUCH DOWN	DISTANCE (KM)	SO_2 FLUX (MT/D)
3 Aug 74	3	0829-0849	5.5	PS	YES	25.0	1107
	8	1033-1153	5.9	PS	YES	11.1	604
	10	1226-1244	7.0	PS	YES	28.6	1262
	11	1247-1308	7.0	PS	NO	43.0	869
	12	1311-1329	6.3	PS	NO	43.0	534
	20	1700-1733	6.0	PS	YES	18.8	871
	3	0829-0849	5.5	WR	YES	7.5	928
	8	1033-1153	5.9	WR	YES	15.0	811
	10	1226-1244	7.0	WR	NO	15.0	807
	11	1247-1308	7.0	WR	NO	22.9	878
	12	1311-1329	6.3	WR	NO	28.6	523
	20	1700-1733	6.0	WR	YES	10.0	663
	5	0905-0953	5.0	PS+WR	YES	22.4	1577

*PS = Portage des Sioux
WR = Wood River Complex

MT/D. Adding the six separately calculated pairs of fluxes yields an average total of 1633 MT/D, with a standard deviation of 21.7%.

The calculated SO_2 emissions for the Portage des Sioux plume are significantly higher than reported values. The COSPEC results could be challenged on the basis that the nearest flux measurement was 25 kilometers from the plant; other sources between Sioux and the AQML therefore, could have contributed to the high SO_2 Fluxes. However, the Sioux plume was monitored six times over a nine hour period, at varying downwind distances, and under different wind directions. It is unlikely that other contributing sources could have consistently contributed to the flux in the Sioux plume under these circumstances.

Urban Plume. The SO_2 Flux of Urban Plume measurements for two days is summarized below:

- 2 Aug 74: A morning traverse north of St. Louis (Event 3) was dominated by an apparent measurement of the Labadie plume. Calculation of flux for this observation is complicated by the fact that the plume quickly shifted away (Event 5). This suggests that the Labadie plume was held aloft by light winds which changed direction between the two traverses. (The morning was flux: 3234 MT/D SO_2; afternoon flux: 238 MT/D.)
- 3 Aug 74 A north-south traverse 70 km east of the Arch (in Illinois) resulted in two partial crossings of an urban plume: 2182 and 1383 MT/D SO_2 were measured over a 30 km path (partial plume width).

These results are limited in scope because there were few opportunities for Urban Plume measurement during the study. Further, because of the large distances involved, more time is required to complete one Urban Plume crossing than is needed to measure a single source many times. At these great distances, the broad urban plume anomaly is not much greater than the COSPEC's noise level. Hence the selection of the proper baseline becomes more critical. Longer field programs could enhance the chances for gathering more data on the Urban Plume.

PLUME GEOMETRY

Inherent in the AQML plume survey is the measurement of the horizontal plume geometry. Plume centerlines are readily detected by the COSPEC where maximum Burdens of overhead gas are measured; the edges of the plume are defined by the inflection point between the plume anomaly and background. In most cases the plume has an approximate Gaussian distribution; this theoretical shape is seen both in the field as the Total Burden data are collected and on the Flux Maps plotted from the remote sensor results.

Plume Width. The analysis of the COSPEC results for plume width begins with the Flux Maps. Each plume cross section shown on the maps is in itself an instantaneous measurement of the width of the plume. Tables VI and VII list plume width the Labadie and Sioux plants. The data were collected on four different days; the plume width, the distance from the

Table VI

PLUME WIDTH

Labadie

DATE	EVENT	TIME (CDT)	WIND M/S	TOUCH DOWN	PLUME	
					DISTANCE (km)	WIDTH (km)
29 Jul 74	5	1436-1445	4.9	NO	7.2	5.6
	7	1457-1500	4.9	NO	2.5	2.0
	9	1506-1511	5.5	NO	2.5	1.4
	12	1523-1527	5.5	NO	1.2	0.9
	13	1528-1532	6.1	NO	1.2	0.6
	15.01	1538-1547	6.1	NO	2.7	0.9
	15.02	1548-1553	6.1	NO	7.3	2.3
	17	1616-1624	6.1	NO	11.0	4.3
31 Jul 74	6	0928-0941	1.7	NO	20.8	4.5
	8	0957-1008	1.4	NO	17.0	6.0
	11	1032-1041	1.5	NO	17.2	9.0
	13	1052-1104	1.5	NO	22.7	7.7
	14	1105-1115	1.4	NO	23.5	8.8
	15	1115-1132	1.5	NO	39.0	10.0
	17	1152-1207	1.6	YES	28.7	8.4
	19	1300-1312	1.6	YES	34.8	14.0
	23	1435-1501	3.0	YES	39.0	19.0
1 Aug 74	2	0823-0843	6.9	NO	27.0	8.5
	3	0846-0904	6.9	NO	16.8	10.8
	4	0905-0925	5.2	NO	16.8	12.5
	5	0926-0936	5.2	NO	17.5	15.3
	6	1004-1024	5.2	NO	17.9	13.5
	7	1037-1056	2.5	YES	18.2	10.5
	9	1130-1213	2.5	YES	28.8	18.6

Table VII

PLUME WIDTH

Portage des Sioux

DATE	EVENT	TIME (CDT)	WIND M/S	TOUCH DOWN	PLUME	
					DISTANCE (km)	WIDTH (km)
3 Aug 74	3	0829-0849	5.5	YES	25.0	5.5
	8	1033-1153	5.9	YES	29.0	4.2
	10	1226-1244	7.0	YES	28.8	9.0
	11	1247-1308	7.0	YES	43.0	8.0
	12	1311-1329	6.3	NO	42.6	8.8
	22	1742-1756	5.1	NO	28.8	6.7

source and evidence of plume touchdown are tabulated. A general review of these figures suggests that plume widths vary for each day, presumably because of differing wind gustiness. Further analysis of these results can be made to relate plume width to atmospheric turbulance data gathered at the study site.

Sigma. By relating a number of these cross sections spatially and temporally the statistical expression describing plume width, σ_y, can be determined. Two methods of deriving σ_y from the remote sensor data can be used; analysis of a "Z" pattern traverse, (several plume crossings at several different radii) and analysis of repeated plume crossings at one radii. Two sets of data taken in the vicinity of the Labadie Power Plant are used to illustrate these analyses.

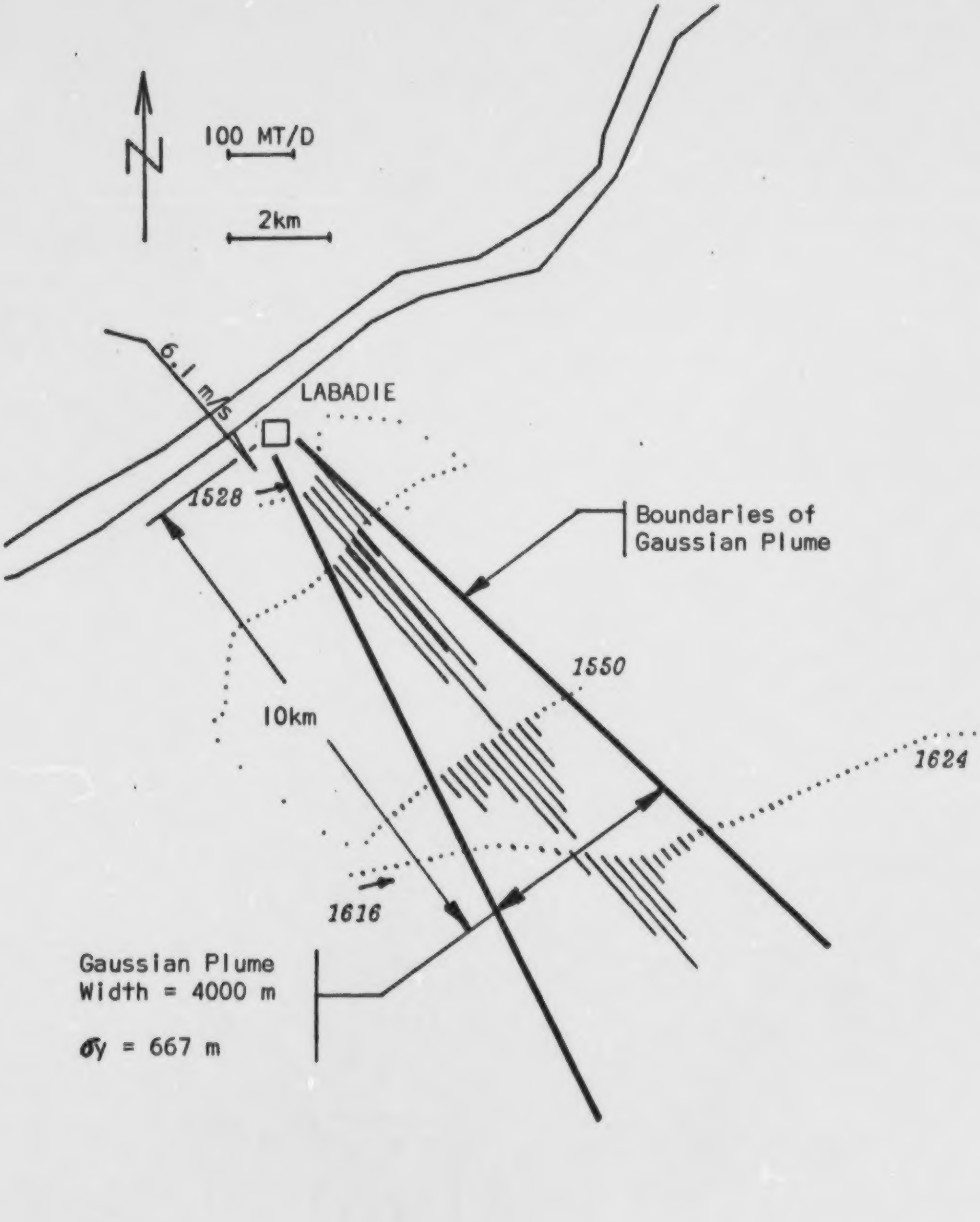
The "Z" pattern traverse for 29 July 74 (Events 13-17) included four measurements in one hour of the overhead plume at four different distances downwind of the stacks. In Figure 7 the Flux Map for these events is reproduced with added boundary lines; these boundaries were drawn as straight lines from the stacks (assuming a point source) to the edge of the "widest" instantaneous plume such that the angle formed includes all four measured plumes. This is an approximation of the one percent boundaries of the Gaussian plume--the theoretical plume width computed for many plume models. In this example the Gaussian plume is shown as a sector because the boundaries are straight lines; this is not precisely true

Figure 7

PLUME WIDTH ANALYSIS

SO_2 Flux Map

29 July 1974 Events 13-17


100 MT/D
2km
6.1 m/s
LABADIE
1528
Boundaries of Gaussian Plume
1550
10km
1624
1616
Gaussian Plume Width = 4000 m
σy = 667 m

for Gaussian plume models but is a good first order approximation.

The σy can be computed for this Gaussian plume at a given downwind distance. For example, at 10 kilometers σy = 667 meters (one-sixth of the 4000 meter plume width).

To estimate σy from a set of multiple plume cross sections taken on one traverse route the COSPEC data were averaged to determine the "average plume". Again using Labadie plume data four plume crossings for 31 July 74 (Events 7,8,10,11) taken over a period of one hour were averaged. Figure 8 reproduces one Flux Map (Event 8) for the radius 17 km from the power plant. Superimposed on the map is the "average plume" calculated from the Total Burden data for the four crossings. This average Burden profile (close to a Gaussian shaped curve) was sketched by hand. The boundaries of the Gaussian plume were added as solid straight lines. The σy for this case is 917 meters at 10 kilometers. Comparing the two σy's suggests that the wind gustiness for 31 July 74 (σy = 917 m) was greater than for 29 July 74 (σy = 667 m).

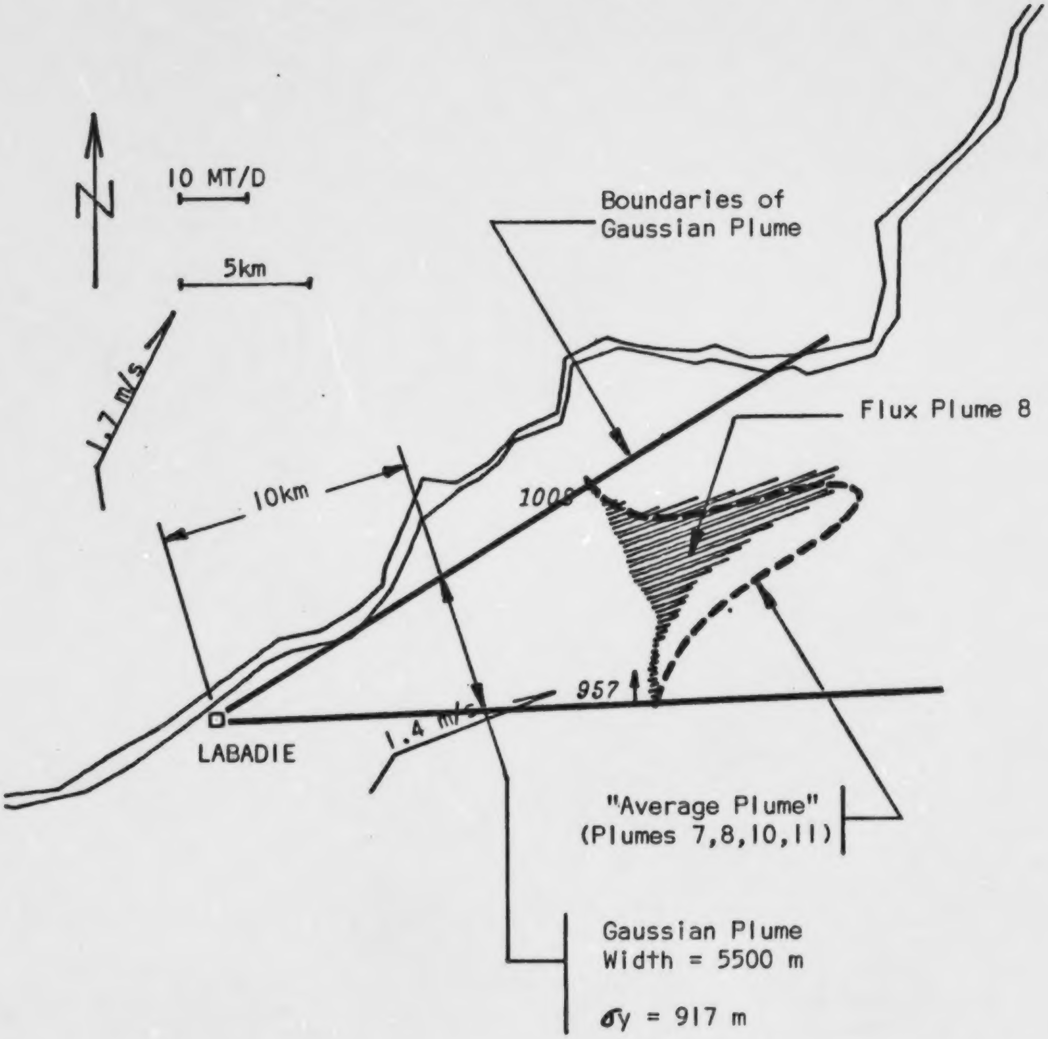
These examples serve to demonstrate how remote sensor data can be used to evaluate plume geometry. Further analyses may lead to the development of a method for making real-time, in-the-field measurements of horizontal dispersion coefficients for use in models of source plume/atmospheric interactions.

Figure 8

PLUME WIDTH ANALYSIS

SO_2 Flux Map

31 July 74 Events 7,8,10,11


10 MT/D
5km
1.7 m/s
10km
1008
957
1.4 m/s
LABADIE
Boundaries of Gaussian Plume
Flux Plume 8
"Average Plume" (Plumes 7,8,10,11)

Gaussian Plume Width = 5500 m

σy = 917 m

APPENDIX A
DATA LISTINGS

The reduced data are listed under five headings:

- Time (CDT)
- X coordinate (km)
- Y coordinate (km)
- SO_2 Total Burden (ppm-meter)
- SO_2 Ground Level (ppb)

The SO_2 results may be converted to metric units as follows:

Multiply ppm-meter by 2.62 to obtain mg/m^2
Multiply ppb by 2.62 to obtain ug/m^3

A two-page Index preceeds the Data Listing showing the date, time and event numbers in chronological order.

DATA LISTINGS

INDEX

DATE	TIME (CDT)	EVENTS
29 Jul 74	1436-1445	5.01
	1457-1500	7.01
	1501-1506	8.01
	1506-1511	9.01
	1518-1521	11.01
	1523-1527	12.01
	1528-1532	13.01
	1533-1538	14.01
	1538-1548	15.01
	1548-1553	15.02
	1616-1623	17.01
30 Jul 74	0943-1028	4.01
	1028-1030	4.02
	1030-1050	4.03
	1053-1103	4.04
	1103-1111	4.05
	1111-1115	4.06
	1120-1130	5.01
	1142-1158	6.01
	1201-1205	7.01
	1205-1215	7.02
	1257-1332	8.01
	1333-1414	9.01
	1414-1426	10.01
	1437-1458	10.02
	1510-1536	12.01
31 Jul 74	0905-0920	5.01
	0928-0941	6.01
	0941-0956	7.01
	0957-1008	8.01
	1021-1031	10.01
	1032-1041	11.01
	1052-1104	13.01
	1105-1115	14.01
	1115-1118	15.01
	1119-1132	15.02
	1132-1145	16.01
	1152-1207	17.01
	1300-1312	19.01
	1318-1334	20.01
	1342-1349	21.01
	1349-1400	22.01
	1400-1419	22.01
	1435-1443	23.02
	1443-1501	23.02

Index (cont'd)

DATE	TIME (CDT)	EVENTS
1 Aug 74	0823-0832	2.01
	0832-0843	2.02
	0846-0904	3.01
	0905-0921	4.01
	0922-0925	4.02
	0926-0929	5.01
	9030-0936	5.02
	1004-1024	6.01
	1037-1046	7.01
	1046-1056	7.02
	1130-1152	9.01
	1152-1213	9.01
	1307-1324	11.01
	1324-1339	11.02
	1341-1401	12.01
	1501-1517	15.01
	1517-1525	16.01
2 Aug 74	1115-1121	3.01
	1123-1126	3.02
	1126-1129	3.02
	1130-1140	3.03
	1141-1206	3.04
	1247-1319	5.01
	1331-1342	5.02
	1342-1357	5.02
3 Aug 74	0829-0849	3.01
	0905-0918	5.01
	0919-0953	5.02
	1033-1051	8.01
	1056-1137	8.02
	1137-1153	8.03
	1226-1244	10.01
	1247-1259	11.01
	1300-1308	11.02
	1311-1329	12.01
	1334-1340	13.01
	1351-1359	14.01
	1426-1441	16.01
	1442-1517	17.01
	1520-1624	18.01
	1626-1700	19.01
	1700-1733	20.01
	1734-1742	21.01
	1742-1748	22.01
	1748-1756	22.02

29 JULY 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1436.	697.6	4268.2	0.	0.
1436.	697.5	4268.1	0.	0.
1436.	697.4	4268.0	0.	0.
1437.	697.2	4268.0	0.	0.
1437.	697.1	4267.9	0.	0.
1437.	697.0	4267.7	0.	0.
1437.	696.9	4267.5	0.	0.
1437.	696.8	4267.4	0.	0.
1437.	696.7	4267.2	0.	0.
1437.	696.6	4267.2	0.	0.
1438.	696.5	4267.1	0.	0.
1438.	696.4	4267.1	0.	0.
1438.	696.3	4267.0	0.	0.
1438.	696.2	4267.0	0.	0.
1438.	696.0	4267.0	0.	0.
1438.	695.9	4266.9	0.	0.
1438.	695.7	4266.9	0.	0.
1439.	695.7	4266.7	0.	0.
1439.	695.6	4266.5	0.	0.
1439.	695.6	4266.3	0.	0.
1439.	695.6	4266.1	15.	0.
1439.	695.5	4266.0	0.	0.
1439.	695.4	4266.0	15.	0.
1439.	695.4	4265.9	0.	0.
1439.	695.3	4265.8	45.	0.
1439.	695.3	4265.7	106.	0.
1439.	695.3	4265.6	136.	0.
1440.	695.3	4265.5	181.	0.
1440.	695.3	4265.4	317.	0.
1440.	695.1	4265.3	393.	0.
1440.	694.9	4265.3	555.	0.
1440.	694.8	4265.2	773.	0.
1440.	694.6	4265.1	955.	0.
1440.	694.5	4265.0	1052.	0.
1440.	694.4	4265.0	973.	0.
1440.	694.2	4264.9	1406.	0.
1440.	694.1	4264.8	1607.	0.
1440.	694.0	4264.8	1312.	0.
1441.	693.9	4264.7	1189.	0.
1441.	693.8	4264.7	1078.	0.
1441.	693.8	4264.6	886.	0.
1441.	693.6	4264.5	1052.	0.
1441.	693.4	4264.4	726.	0.
1441.	693.2	4264.3	695.	0.
1442.	693.0	4264.2	136.	0.
1442.	692.9	4264.1	226.	0.
1442.	692.7	4264.0	483.	0.
1442.	692.6	4264.0	393.	0.
1442.	692.5	4263.9	453.	0.
1442.	692.2	4263.7	1024.	0.
1443.	691.9	4263.5	498.	0.

```
        29  JULY  74   EVENT   5.01


TIME      X          Y        SO2-TB    SO2-GL
(CDT)    (KM)       (KM)     (PPM-M)    (PPB)


1443.   691.7     4263.3    1132.         0.
1443.   691.4     4263.1     423.         0.
1444.   691.2     4263.0     302.         0.
1444.   691.0     4262.8     166.         0.
1444.   690.9     4262.7      30.         0.
1444.   690.7     4262.5      15.         0.
1444.   690.5     4262.4      30.         0.
1445.   690.4     4262.2       0.         0.
1445.   690.3     4262.1       0.         0.
1445.   690.1     4261.9       0.         0.
```

```
29  JULY  74   EVENT   7.01


TIME       X          Y        SO2-TB   SO2-GL
(CDT)    (KM)       (KM)      (PPM-M)   (PPB)


1457.   692.4     4269.5         0.        0.
1457.   692.3     4269.5         0.        0.
1457.   692.1     4269.4         0.        0.
1457.   692.0     4269.4         0.        0.
1457.   691.9     4269.3        15.        0.
1457.   691.7     4269.3         0.        0.
1457.   691.6     4269.2        15.        0.
1457.   691.4     4269.2         0.        0.
1457.   691.4     4269.1        15.        0.
1458.   691.3     4269.1        15.        0.
1458.   691.2     4269.0         0.        0.
1458.   691.1     4269.0         0.        0.
1458.   691.0     4268.9        30.        0.
1458.   690.9     4268.9       408.        0.
1458.   690.8     4268.8       863.        0.
1458.   690.8     4268.8      1572.        0.
1458.   690.7     4268.7      1406.        0.
1458.   690.6     4268.7      1716.        0.
1458.   690.6     4268.6       838.        0.
1458.   690.5     4268.6      1648.        0.
1459.   690.5     4268.5      1389.        0.
1459.   690.4     4268.5      1104.        0.
1459.   690.3     4268.4       347.        0.
1459.   690.2     4268.2       710.        0.
1459.   690.1     4268.1      1078.        0.
1459.   690.0     4268.0      1913.        0.
1459.   689.9     4267.8       332.        0.
1459.   689.8     4267.7      1027.        0.
1459.   689.7     4267.5        15.        0.
1459.   689.6     4267.5         0.        0.
1500.   689.5     4267.4         0.        0.
1500.   689.4     4267.3        30.        0.
1500.   689.4     4267.3        15.        0.
1500.   689.3     4267.2         0.        0.
1500.   689.2     4267.1         0.        0.
1500.   689.1     4267.0         0.        0.
```

29 JULY 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1506.	692.4	4269.5	0.	0.
1506.	692.2	4269.4	0.	0.
1506.	692.0	4269.4	0.	0.
1506.	691.8	4269.3	0.	0.
1505.	691.6	4269.3	15.	0.
1505.	691.4	4269.2	0.	0.
1505.	691.3	4269.1	15.	0.
1505.	691.2	4269.0	30.	0.
1504.	691.1	4269.0	45.	0.
1504.	691.0	4268.9	60.	0.
1504.	690.8	4268.8	75.	0.
1504.	690.7	4268.7	468.	0.
1504.	690.7	4268.7	136.	0.
1503.	690.6	4268.6	423.	0.
1503.	690.5	4268.6	1106.	0.
1503.	690.4	4268.5	>3000.	0.
1503.	690.3	4268.3	1793.	0.
1503.	690.1	4268.1	982.	0.
1503.	690.0	4267.9	121.	0.
1503.	689.8	4267.7	15.	0.
1502.	689.7	4267.5	0.	0.
1502.	689.6	4267.4	15.	0.
1502.	689.5	4267.3	0.	0.
1501.	689.3	4267.2	0.	0.
1501.	689.2	4267.1	0.	0.
1501.	689.1	4267.0	15.	0.

29 JULY 74 EVENT 9.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1506.	692.4	4269.5	0.	0.
1506.	692.2	4269.4	0.	0.
1506.	692.0	4269.4	38.	0.
1506.	691.8	4269.3	0.	0.
1507.	691.6	4269.3	0.	0.
1507.	691.4	4269.2	0.	0.
1507.	691.3	4269.1	0.	0.
1507.	691.2	4269.0	0.	0.
1507.	691.1	4269.0	0.	0.
1508.	691.0	4268.9	0.	0.
1508.	690.8	4268.8	0.	0.
1508.	690.7	4268.7	38.	0.
1508.	690.7	4268.7	38.	0.
1508.	690.6	4268.6	75.	0.
1508.	690.5	4268.6	189.	0.
1508.	690.4	4268.5	1625.	0.
1509.	690.3	4268.3	>3000.	0.
1509.	690.1	4268.1	1372.	0.
1509.	690.0	4267.9	2202.	0.
1509.	689.8	4267.7	38.	0.
1509.	689.7	4267.5	0.	0.
1510.	689.6	4267.4	0.	0.
1510.	689.5	4267.3	0.	0.
1510.	689.3	4267.2	0.	0.
1510.	689.2	4267.1	0.	0.
1510.	689.1	4267.0	0.	0.
1510.	688.9	4266.9	0.	0.
1511.	688.6	4266.8	0.	0.
1511.	688.4	4266.7	0.	0.
1511.	688.1	4266.6	0.	0.
1511.	687.9	4266.4	0.	0.
1511.	687.9	4266.4	0.	0.
1511.	687.8	4266.4	0.	0.
1511.	687.8	4266.3	0.	0.
1511.	687.7	4266.3	0.	0.
1511.	687.6	4266.2	0.	0.

29 JULY 74 EVENT 11.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1518.	688.1	4268.7	0.	0.
1518.	688.3	4268.8	0.	0.
1518.	688.4	4268.8	0.	0.
1518.	688.6	4268.8	0.	0.
1519.	688.7	4268.8	0.	0.
1519.	688.9	4268.9	0.	0.
1519.	689.0	4268.9	0.	0.
1519.	689.1	4268.9	0.	0.
1520.	689.3	4269.0	0.	0.
1520.	689.3	4269.2	1079.	0.
1520.	689.3	4269.4	75.	0.
1520.	689.4	4269.5	>3000.	0.
1521.	689.4	4269.7	838.	0.
1521.	689.4	4269.9	>3000.	0.
1521.	689.4	4270.1	0.	0.
1521.	689.4	4270.3	0.	0.
1521.	689.5	4270.5	0.	0.

29 JULY 74 EVENT 12.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1527.	688.1	4268.7	0.	0.
1527.	688.3	4268.8	0.	0.
1526.	688.5	4268.8	0.	0.
1526.	688.7	4268.8	0.	0.
1526.	688.9	4268.9	0.	0.
1525.	689.1	4268.9	453.	0.
1525.	689.3	4269.0	1717.	0.
1525.	689.3	4269.2	>3000.	0.
1525.	689.3	4269.5	2020.	0.
1525.	689.4	4269.7	>3000.	0.
1524.	689.4	4270.0	38.	0.
1524.	689.4	4270.2	0.	0.
1523.	689.5	4270.5	0.	0.

29 JULY 74 EVENT 13.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1528.	688.1	4268.7	0.	0.
1528.	688.4	4268.8	0.	0.
1529.	688.6	4268.8	0.	0.
1529.	688.8	4268.9	0.	0.
1530.	689.1	4268.9	0.	0.
1530.	689.3	4269.0	2380.	0.
1531.	689.3	4269.3	>3000.	0.
1531.	689.4	4269.6	38.	0.
1531.	689.4	4269.9	0.	0.
1532.	689.4	4270.2	0.	0.
1532.	689.5	4270.5	0.	0.

```
     29  JULY  74   EVENT  14.01


TIME       X        Y       SO2-TR   SO2-GL
(CDT)    (KM)     (KM)     (PPM-M)   (PPB)


1533.   692.4    4269.5      0.        0.
1536.   691.4    4269.2      0.        0.
1538.   690.8    4268.8      0.        0.
```

29 JULY 74 EVENT 15.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1538.	690.8	4268.8	0.	0.
1538.	690.7	4268.7	0.	0.
1538.	690.5	4268.6	0.	0.
1539.	690.4	4268.5	0.	0.
1539.	690.2	4268.2	0.	0.
1540.	689.9	4267.9	>3000.	0.
1540.	689.7	4267.5	0.	0.
1540.	689.5	4267.4	0.	0.
1540.	689.3	4267.2	0.	0.
1540.	689.1	4267.0	0.	0.
1541.	688.7	4266.8	0.	0.
1542.	688.3	4266.6	0.	0.
1542.	687.9	4266.4	0.	0.
1542.	687.8	4266.4	0.	0.
1542.	687.7	4266.3	0.	0.
1542.	687.6	4266.2	0.	0.
1542.	687.6	4265.9	0.	0.
1543.	687.6	4265.7	0.	0.
1543.	687.5	4265.4	0.	0.
1543.	687.5	4265.1	0.	0.
1543.	687.5	4264.9	0.	0.
1543.	687.5	4264.6	0.	0.
1544.	687.3	4264.5	0.	0.
1544.	687.2	4264.5	0.	0.
1544.	687.1	4264.4	0.	0.
1544.	687.3	4264.1	0.	0.
1544.	687.5	4263.8	0.	0.
1545.	687.7	4263.5	0.	0.
1545.	687.9	4263.4	0.	0.
1545.	688.1	4263.4	0.	0.
1546.	688.3	4263.3	0.	0.
1546.	688.6	4263.0	0.	0.
1546.	688.8	4262.7	0.	0.
1620.	689.1	4262.4	0.	0.
1547.	689.4	4262.2	0.	0.
1547.	689.8	4262.1	0.	0.
1547.	690.1	4261.9	0.	0.

29 JULY 74 EVENT 15.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1553.	694.6	4265.1	0.	0.
1553.	694.5	4265.0	0.	0.
1552.	694.4	4265.0	0.	0.
1552.	694.2	4264.9	15.	0.
1552.	694.1	4264.8	0.	0.
1552.	694.0	4264.8	0.	0.
1552.	693.9	4264.7	0.	0.
1552.	693.8	4264.7	30.	0.
1552.	693.8	4264.6	0.	0.
1551.	693.6	4264.5	30.	0.
1551.	693.4	4264.4	196.	0.
1551.	693.2	4264.3	423.	0.
1551.	693.0	4264.2	513.	0.
1551.	692.9	4264.1	570.	0.
1551.	692.7	4264.0	1132.	0.
1551.	692.6	4264.0	688.	4.
1551.	692.5	4263.9	438.	0.
1550.	692.2	4263.7	106.	0.
1550.	691.9	4263.5	408.	0.
1550.	691.7	4263.3	0.	0.
1550.	691.4	4263.1	0.	0.
1549.	691.2	4263.0	0.	0.
1549.	691.0	4262.8	15.	0.
1549.	690.9	4262.7	15.	0.
1549.	690.7	4262.5	15.	0.
1549.	690.5	4262.4	0.	0.
1548.	690.4	4262.2	0.	0.
1548.	690.3	4262.1	0.	0.
1548.	690.1	4261.9	0.	0.

29 JULY 74 EVENT 17.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1616.	689.8	4261.4	0.	0.
1616.	690.8	4261.6	15.	0.
1617.	691.9	4261.8	0.	0.
1617.	692.9	4262.0	0.	0.
1617.	693.2	4262.0	15.	0.
1618.	693.5	4261.9	0.	0.
1618.	693.9	4261.9	45.	0.
1619.	694.3	4261.8	30.	0.
1619.	694.8	4261.7	1132.	0.
1619.	695.3	4261.7	513.	0.
1620.	695.5	4261.7	377.	0.
1620.	695.7	4261.7	136.	0.
1620.	695.9	4261.7	91.	0.
1620.	696.1	4261.9	60.	0.
1621.	696.4	4262.0	91.	0.
1621.	696.6	4262.2	45.	0.
1621.	697.0	4262.3	30.	0.
1621.	697.3	4262.4	30.	0.
1622.	697.7	4262.4	15.	0.
1622.	699.0	4263.0	0.	0.
1622.	700.2	4263.5	0.	0.
1623.	701.5	4264.0	0.	0.
1623.	701.8	4264.0	0.	0.
1623.	702.2	4264.1	0.	0.
1623.	702.5	4264.1	0.	0.

30 JULY 74 EVENT 4.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
943.	740.8	4310.7	0.	0.
943.	741.2	4310.4	0.	0.
944.	741.6	4310.2	0.	0.
945.	742.2	4309.7	0.	0.
945.	742.7	4309.2	0.	0.
946.	743.4	4308.6	0.	0.
947.	744.0	4308.0	0.	0.
948.	744.2	4308.0	15.	12.
948.	744.4	4308.0	0.	0.
949.	744.7	4308.0	0.	0.
949.	745.0	4308.0	0.	0.
950.	745.2	4308.0	0.	30.
950.	745.4	4308.0	0.	0.
951.	745.7	4307.9	30.	58.
951.	746.0	4307.8	0.	0.
952.	746.4	4307.8	15.	27.
952.	746.7	4307.8	0.	0.
953.	747.3	4307.8	0.	0.
953.	748.0	4307.8	30.	0.
954.	749.0	4307.6	15.	39.
957.	750.0	4307.4	30.	0.
957.	750.2	4307.2	45.	0.
957.	750.4	4307.0	75.	0.
958.	750.6	4306.3	30.	54.
958.	750.8	4305.5	15.	0.
959.	751.0	4305.1	15.	0.
959.	751.1	4304.6	45.	0.
1000.	751.5	4304.0	75.	70.
1000.	751.9	4303.5	0.	0.
1000.	752.0	4303.1	0.	0.
1001.	752.0	4302.7	0.	0.
1001.	752.0	4302.3	0.	0.
1002.	752.0	4301.8	0.	0.
1002.	752.0	4301.5	0.	0.
1002.	751.9	4301.1	0.	0.
1003.	752.0	4300.8	0.	0.
1003.	752.0	4300.5	15.	0.
1004.	752.0	4299.5	15.	0.
1004.	752.1	4298.6	0.	0.
1005.	752.0	4298.2	15.	0.
1005.	751.9	4297.8	0.	0.
1006.	751.6	4296.9	0.	0.
1007.	751.3	4296.0	15.	0.
1007.	751.1	4295.8	15.	0.
1007.	750.8	4295.6	0.	0.
1008.	750.8	4295.0	0.	0.
1008.	750.7	4294.4	0.	0.
1009.	750.3	4293.6	0.	0.
1009.	750.0	4292.9	30.	0.
1009.	749.9	4292.6	15.	0.
1009.	749.9	4292.4	0.	0.

30 JULY 74 EVENT 4.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1010.	749.4	4291.5	0.	0.
1011.	749.0	4290.6	15.	0.
1013.	748.6	4289.8	15.	0.
1014.	748.1	4289.0	0.	0.
1014.	747.9	4288.8	0.	0.
1014.	747.6	4288.6	0.	0.
1015.	747.6	4288.1	75.	0.
1016.	747.6	4287.5	60.	0.
1020.	747.9	4287.2	30.	0.
1021.	748.3	4286.9	45.	0.
1023.	748.0	4286.7	15.	0.
1024.	747.8	4286.4	0.	0.
1024.	747.7	4286.2	15.	0.
1024.	747.5	4286.0	0.	0.
1025.	747.4	4285.3	0.	0.
1026.	747.3	4284.6	0.	0.
1026.	747.1	4284.5	0.	0.
1026.	746.9	4284.3	0.	0.
1027.	746.6	4284.1	0.	0.
1027.	746.3	4283.9	0.	0.
1028.	746.3	4283.5	0.	0.
1028.	746.3	4283.2	0.	0.

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30  JULY  74   EVENT   4.02


TIME        X          Y       SO2-TB   SO2-GL
(CDT)     (KM)       (KM)    (PPM-M)    (PPB)


1028.    746.3     4283.2       0.        0.
1028.    746.3     4283.1       0.        0.
1028.    746.4     4282.9       0.        0.
1028.    746.4     4282.8       0.        0.
1029.    746.5     4282.7      15.        0.
1029.    746.4     4282.6      15.        0.
1029.    746.4     4282.5      15.        0.
1029.    746.3     4282.4     362.        0.
1029.    746.3     4282.2      15.        1.
1029.    746.3     4282.2       0.        0.
1029.    746.3     4282.1       0.        0.
1029.    746.4     4282.0       0.        0.
1029.    746.4     4281.9       0.        0.
1029.    746.5     4281.8       0.        0.
1029.    746.5     4281.7       0.        0.
1030.    746.6     4281.6       0.        0.
1030.    746.7     4281.4       0.        0.
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30 JULY 74 EVENT 4.03

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1030.	746.7	4281.4	0.	0.
1031.	747.0	4280.9	0.	0.
1032.	747.6	4280.3	0.	0.
1033.	748.2	4279.7	15.	0.
1034.	748.3	4279.5	15.	0.
1034.	747.0	4278.7	0.	0.
1037.	746.7	4277.8	0.	0.
1044.	746.3	4277.5	0.	0.
1045.	746.4	4277.1	0.	0.
1045.	746.3	4276.3	0.	0.
1046.	746.3	4275.8	0.	0.
1046.	746.0	4275.0	0.	0.
1047.	745.9	4274.3	0.	0.
1047.	745.6	4273.7	0.	0.
1048.	745.3	4273.0	0.	0.
1049.	745.0	4272.7	0.	0.
1049.	744.8	4272.5	0.	0.
1050.	744.8	4272.1	0.	0.
1050.	744.5	4269.9	0.	0.

30 JULY 74 EVENT 4.04

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1053.	744.5	4269.9	0.	0.
1053.	744.5	4269.8	30.	0.
1053.	744.5	4269.7	0.	0.
1053.	744.5	4269.6	15.	0.
1053.	744.5	4269.6	0.	0.
1053.	744.5	4269.5	0.	0.
1053.	744.4	4269.5	0.	0.
1053.	744.4	4269.5	0.	0.
1053.	744.3	4269.5	0.	0.
1054.	744.2	4269.4	0.	0.
1054.	744.1	4269.2	15.	0.
1054.	744.0	4269.0	15.	0.
1054.	743.9	4268.9	0.	0.
1054.	743.8	4268.5	0.	0.
1054.	743.7	4268.0	0.	0.
1055.	743.5	4267.6	0.	0.
1055.	743.4	4267.2	15.	0.
1055.	743.3	4267.0	15.	0.
1055.	743.3	4266.8	15.	0.
1055.	743.3	4266.6	30.	0.
1056.	743.2	4266.4	15.	0.
1056.	743.3	4266.3	30.	0.
1056.	743.3	4266.2	60.	0.
1056.	743.4	4266.1	30.	0.
1056.	743.5	4266.0	60.	0.
1056.	743.4	4265.8	75.	0.
1057.	743.4	4265.6	75.	0.
1057.	743.4	4265.4	106.	0.
1057.	743.3	4265.2	121.	0.
1057.	743.3	4265.0	166.	0.
1054.	743.2	4264.7	650.	0.
1057.	743.2	4264.4	347.	0.
1058.	743.1	4264.1	272.	0.
1058.	743.0	4263.9	211.	0.
1058.	742.9	4263.7	181.	0.
1058.	742.8	4263.5	166.	0.
1058.	742.7	4263.3	151.	0.
1058.	742.6	4263.1	136.	0.
1058.	742.6	4262.9	91.	0.
1059.	742.6	4262.7	151.	0.
1059.	742.5	4262.5	166.	0.
1059.	742.5	4262.3	136.	0.
1059.	742.4	4262.0	226.	0.
1059.	742.3	4261.7	121.	0.
1100.	742.3	4261.5	181.	0.
1101.	742.3	4261.2	106.	0.
1101.	742.3	4260.9	106.	0.
1101.	742.3	4260.7	91.	0.
1101.	742.3	4260.4	75.	0.
1102.	742.3	4260.3	91.	0.
1102.	742.4	4260.1	181.	0.

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        30  JULY  74   EVENT   4.04


TIME        X         Y      SO2-TB   SO2-GL
(CDT)     (KM)      (KM)    (PPM-M)   (PPM)


1102.   742.4    4259.9    272.        0.
1102.   742.5    4259.7    196.        0.
1102.   742.6    4259.4     75.        0.
1102.   742.7    4259.1    136.        0.
1103.   742.8    4258.7     60.        0.
1103.   743.0    4258.4     91.        0.
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30 JULY 74 EVENT 4.05

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1103.	743.0	4258.4	91.	0.
1106.	745.3	4257.5	121.	0.
1106.	746.1	4256.9	121.	0.
1107.	746.5	4256.5	136.	0.
1107.	746.8	4255.8	166.	0.
1108.	747.3	4255.0	181.	0.
1109.	747.1	4253.8	121.	0.
1109.	747.1	4253.6	136.	0.
1110.	747.5	4252.5	151.	0.
1111.	747.6	4252.2	136.	0.

30 JULY 74 EVENT 4.06

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1111.	747.6	4252.2	136.	0.
1111.	747.7	4251.9	121.	0.
1111.	747.8	4251.6	121.	0.
1112.	748.2	4250.5	136.	0.
1112.	748.5	4249.3	181.	20.
1113.	748.6	4248.8	196.	66.
1113.	748.8	4248.3	151.	58.
1114.	748.9	4247.3	121.	22.
1114.	749.1	4246.4	106.	0.
1115.	749.1	4246.1	106.	0.
1115.	749.2	4245.8	106.	0.

30 JULY 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1120.	749.2	4245.8	45.	0.
1120.	749.5	4245.8	75.	0.
1120.	749.8	4245.8	75.	0.
1120.	750.2	4245.5	60.	0.
1121.	750.6	4245.2	60.	0.
1121.	751.0	4245.1	75.	0.
1122.	751.4	4245.0	75.	0.
1122.	752.0	4244.9	45.	0.
1122.	752.6	4244.8	45.	0.
1122.	752.6	4244.7	75.	0.
1123.	752.7	4244.6	91.	0.
1123.	753.0	4244.4	91.	0.
1123.	753.2	4244.1	75.	0.
1123.	753.6	4243.8	91.	0.
1124.	754.0	4243.5	60.	0.
1124.	754.4	4243.4	60.	0.
1124.	754.8	4243.3	91.	0.
1125.	755.2	4243.4	91.	0.
1125.	755.7	4243.6	106.	0.
1126.	756.3	4243.5	91.	11.
1126.	756.8	4243.5	106.	21.
1126.	757.2	4243.5	106.	33.
1127.	757.6	4243.4	91.	42.
1127.	758.2	4243.4	106.	58.
1127.	758.8	4243.4	121.	83.
1128.	759.3	4243.4	106.	89.
1128.	759.9	4243.4	181.	65.
1128.	760.2	4243.5	181.	86.
1129.	760.4	4243.5	226.	78.
1129.	761.4	4243.5	257.	102.
1130.	762.4	4243.6	226.	124.

30 JULY 74 EVENT 6.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1158.	762.7	4265.4	15.	0.
1158.	762.8	4264.9	0.	0.
1157.	762.8	4264.1	0.	0.
1156.	762.8	4263.5	0.	0.
1155.	762.9	4262.1	15.	0.
1154.	762.9	4261.2	15.	0.
1154.	763.0	4260.1	30.	0.
1153.	763.0	4259.2	45.	0.
1153.	763.0	4258.9	30.	0.
1152.	763.1	4256.8	136.	98.
1152.	763.0	4256.4	151.	128.
1151.	762.4	4255.8	332.	92.
1150.	762.3	4255.0	136.	48.
1150.	762.3	4254.0	136.	36.
1149.	762.4	4253.2	151.	36.
1148.	762.5	4252.0	151.	30.
1148.	762.4	4251.2	166.	50.
1147.	762.1	4250.6	166.	58.
1146.	762.2	4248.7	136.	24.
1146.	762.2	4248.3	151.	24.
1145.	762.2	4247.9	151.	26.
1145.	762.3	4247.1	121.	8.
1144.	762.3	4246.3	106.	0.
1144.	762.3	4246.1	106.	2.
1144.	762.3	4245.5	106.	32.
1143.	762.3	4244.7	181.	82.
1142.	762.4	4243.6	272.	140.

30 JULY 74 EVENT 7.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1205.	757.1	4262.4	15.	0.
1205.	757.7	4262.8	0.	0.
1204.	758.3	4263.1	0.	0.
1204.	758.8	4263.5	0.	0.
1204.	759.6	4264.4	0.	0.
1203.	759.6	4264.8	0.	0.
1203.	760.3	4264.9	0.	0.
1202.	760.5	4265.1	0.	0.
1201.	760.8	4265.4	0.	0.
1201.	761.3	4265.7	0.	0.
1201.	762.7	4265.4	0.	0.

30 JULY 74 EVENT 7.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1215.	746.3	4257.4	121.	14.
1215.	746.8	4257.7	106.	24.
1215.	747.3	4258.1	91.	0.
1214.	747.4	4258.2	75.	0.
1214.	747.4	4258.3	91.	0.
1213.	748.5	4258.3	121.	0.
1213.	749.6	4258.2	91.	0.
1213.	750.1	4258.3	60.	0.
1212.	750.5	4258.3	45.	0.
1212.	750.7	4258.4	45.	0.
1212.	750.8	4258.6	45.	0.
1212.	751.3	4258.9	60.	0.
1211.	751.8	4259.3	60.	16.
1210.	752.3	4259.9	121.	12.
1210.	752.9	4260.5	45.	68.
1209.	753.2	4260.5	91.	62.
1209.	753.6	4260.6	106.	0.
1208.	753.8	4260.6	91.	0.
1208.	754.1	4260.6	75.	0.
1208.	754.4	4260.8	60.	0.
1208.	754.6	4261.0	60.	0.
1208.	754.9	4261.0	75.	0.
1207.	755.1	4261.1	75.	0.
1207.	755.5	4261.3	45.	0.
1206.	755.9	4261.6	30.	0.
1206.	756.5	4262.0	15.	0.
1205.	757.1	4262.4	15.	0.

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30 JULY 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1257.	732.7	4264.3	0.	0.
1301.	733.4	4264.4	0.	0.
1301.	733.7	4264.3	0.	0.
1302.	734.8	4263.8	0.	0.
1302.	735.3	4263.5	0.	0.
1302.	735.9	4263.3	0.	0.
1303.	737.4	4262.9	0.	0.
1304.	738.2	4262.7	0.	0.
1304.	739.2	4262.5	0.	0.
1305.	739.8	4262.3	0.	0.
1306.	740.9	4261.9	0.	0.
1306.	741.5	4261.7	0.	0.
1307.	742.2	4261.5	0.	0.

30 JULY 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1308.	742.3	4261.5	0.	0.
1309.	742.3	4260.4	0.	0.
1310.	742.5	4259.7	15.	0.
1311.	743.0	4258.4	0.	0.
1313.	745.3	4257.5	0.	0.
1314.	746.1	4256.9	0.	0.

30 JULY 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1314.	746.1	4256.9	0.	0.
1315.	746.3	4257.4	0.	0.
1316.	747.3	4258.1	15.	0.
1317.	747.4	4258.3	15.	0.
1318.	749.6	4258.2	0.	0.
1319.	750.5	4258.3	15.	0.
1319.	750.8	4258.6	30.	0.
1320.	751.8	4259.3	15.	0.
1321.	752.9	4260.5	30.	0.
1322.	753.6	4260.6	0.	0.
1323.	754.1	4260.6	0.	0.
1324.	754.6	4261.0	15.	0.
1324.	755.1	4261.1	0.	0.
1325.	755.9	4261.6	0.	0.
1326.	757.1	4262.4	0.	0.
1326.	757.7	4262.8	0.	0.
1326.	758.3	4263.1	0.	0.
1327.	758.8	4263.5	0.	0.
1328.	759.6	4264.4	0.	0.
1328.	759.6	4264.8	0.	0.
1329.	760.3	4264.9	0.	0.
1329.	760.5	4265.1	0.	0.
1329.	760.8	4265.4	30.	0.
1330.	761.3	4265.7	0.	0.
1332.	762.7	4265.4	0.	0.

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30 JULY 74 EVENT 9.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1414.	764.4	4288.2	0.	0.
1414.	764.2	4287.5	0.	0.
1413.	763.9	4287.3	0.	0.
1412.	763.3	4286.3	15.	0.
1410.	762.2	4284.6	15.	0.
1407.	762.2	4284.1	0.	0.
1406.	762.4	4283.2	0.	0.
1405.	762.0	4282.3	15.	0.
1405.	762.0	4281.9	0.	0.
1403.	762.2	4280.3	0.	0.
1402.	762.3	4278.8	0.	0.
1400.	762.4	4277.4	30.	0.
1400.	762.4	4276.5	15.	0.
1399.	762.4	4276.1	30.	0.
1358.	762.4	4275.4	15.	0.
1357.	762.4	4274.6	15.	0.
1357.	762.4	4274.1	30.	0.
1357.	762.4	4273.8	15.	0.
1344.	762.4	4273.0	0.	0.
1343.	762.5	4272.2	0.	0.
1342.	762.5	4271.3	30.	0.
1340.	762.6	4271.0	15.	0.
1340.	762.7	4269.5	0.	0.
1339.	762.7	4268.9	0.	0.
1338.	762.7	4268.3	0.	0.
1337.	762.7	4267.5	0.	0.
1335.	762.7	4266.6	0.	0.
1333.	762.7	4265.4	0.	0.

30 JULY 74 EVENT 10.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1419.	769.9	4293.4	0.	0.
1418.	768.6	4292.7	0.	0.
1417.	768.5	4292.4	15.	0.
1416.	768.2	4291.0	0.	0.
1416.	767.9	4289.4	0.	0.
1415.	767.6	4289.3	30.	0.
1415.	765.7	4288.5	15.	0.
1414.	764.3	4288.3	0.	0.

30 JULY 74 EVENT 10.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1426.	777.8	4294.6	15.	0.
1425.	777.0	4294.7	0.	0.
1425.	775.8	4294.6	0.	0.
1424.	774.8	4294.3	15.	0.
1423.	774.3	4294.1	45.	0.
1421.	773.7	4293.9	30.	0.
1421.	772.7	4293.8	15.	0.
1420.	771.5	4293.7	30.	0.
1420.	770.9	4293.7	0.	0.
1419.	769.8	4293.5	0.	0.

30 JULY 74 EVENT 10.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TH (PPM-M)	SO2-GL (PPB)
1437.	777.8	4294.6	60.	0.
1438.	777.7	4295.7	60.	0.
1439.	777.6	4297.3	60.	0.
1440.	777.6	4298.1	45.	0.
1441.	777.6	4298.6	60.	0.
1441.	777.6	4299.0	30.	0.
1442.	777.5	4300.0	15.	0.
1442.	777.5	4301.0	30.	0.
1443.	777.5	4301.4	45.	0.
1443.	777.5	4302.1	15.	0.
1444.	777.4	4303.8	30.	0.
1445.	777.4	4304.6	0.	0.
1445.	777.4	4305.5	15.	0.
1446.	777.4	4306.7	30.	0.
1447.	777.4	4307.8	30.	0.
1448.	777.4	4308.6	30.	0.
1449.	777.3	4310.2	0.	0.
1450.	777.2	4311.9	30.	0.
1452.	777.2	4313.4	15.	0.
1453.	777.1	4315.1	15.	0.
1454.	777.2	4315.9	0.	0.
1454.	777.1	4316.7	15.	0.
1455.	777.1	4317.5	60.	0.
1456.	777.1	4318.3	45.	0.
1456.	777.1	4319.3	0.	0.
1458.	776.9	4321.2	0.	0.

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  30  JULY  74   EVENT  12.01


TIME       X          Y        SO2-TB   SO2-GL
(CDT)    (KM)       (KM)      (PPM-M)    (PPB)


1510.   762.7    4315.9        0.        0.
1510.   762.8    4314.7       15.        0.
1511.   762.8    4314.2        0.        0.
1511.   762.8    4313.4        0.        0.
1512.   762.7    4312.8        0.        0.
1513.   762.7    4311.9        0.        0.
1513.   762.8    4310.7       15.        0.
1514.   763.0    4309.3        0.        0.
1515.   763.3    4309.3        0.        0.
1516.   763.4    4306.9       15.        0.
1517.   763.7    4306.6        0.        0.
1517.   763.8    4306.1        0.        0.
1518.   763.8    4305.3       15.        0.
1519.   763.8    4303.7        0.        0.
1520.   763.7    4302.8       15.        0.
1520.   763.2    4301.9       15.        0.
1521.   762.9    4301.2       30.        0.
1522.   763.3    4300.9       15.        0.
1524.   764.3    4299.7       45.        0.
1525.   764.6    4299.8       30.        0.
1527.   764.7    4299.0       45.        0.
1529.   764.7    4297.2       75.        0.
1530.   764.8    4296.4       60.        0.
1530.   764.4    4295.7       60.        0.
1531.   764.4    4294.8       45.        0.
1532.   764.4    4293.6       30.        0.
1533.   764.4    4292.8       30.        0.
1534.   764.5    4291.6       15.        0.
1534.   764.4    4290.8        0.        0.
1535.   764.5    4289.5       15.        0.
1536.   764.5    4288.9        0.        0.
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31 JULY 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
905.	704.8	4283.1	0.	0.
905.	704.5	4283.2	0.	0.
906.	704.2	4283.3	15.	0.
906.	703.8	4283.7	0.	0.
907.	703.5	4284.1	15.	0.
907.	703.4	4284.5	0.	0.
907.	703.3	4284.9	45.	0.
907.	703.2	4285.2	0.	0.
908.	703.0	4285.4	0.	0.
908.	702.6	4286.0	45.	0.
909.	702.1	4286.6	30.	0.
909.	701.6	4286.8	30.	0.
909.	701.0	4287.1	30.	0.
910.	700.3	4287.3	30.	0.
910.	699.7	4287.4	30.	0.
911.	698.8	4287.7	15.	0.
912.	698.0	4288.0	0.	0.
912.	697.8	4288.3	30.	0.
912.	697.5	4288.5	91.	0.
913.	697.1	4289.1	226.	0.
914.	696.6	4289.6	121.	0.
915.	696.0	4290.4	226.	0.
916.	695.4	4291.2	45.	0.
916.	695.0	4291.6	75.	0.
917.	694.7	4292.1	75.	0.
917.	694.3	4292.6	106.	0.
918.	693.9	4293.0	45.	0.
918.	693.1	4293.7	30.	0.
919.	692.3	4294.4	91.	0.
919.	691.7	4294.8	60.	0.
920.	691.1	4295.3	0.	0.

31 JULY 74 EVENT 6.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
941.	704.8	4283.1	0.	0.
941.	704.5	4283.2	0.	0.
940.	704.2	4283.3	0.	0.
940.	703.8	4283.7	0.	0.
940.	703.5	4284.1	0.	0.
940.	703.4	4284.5	0.	0.
939.	703.3	4284.9	30.	0.
939.	703.2	4285.2	15.	0.
939.	703.0	4285.4	30.	0.
938.	702.6	4286.0	0.	0.
938.	702.1	4286.6	0.	0.
937.	701.6	4286.8	0.	0.
937.	701.0	4287.1	15.	0.
936.	700.3	4287.3	0.	0.
936.	699.7	4287.4	0.	0.
935.	698.8	4287.7	302.	0.
935.	698.0	4288.0	91.	0.
934.	697.8	4288.3	226.	0.
934.	697.5	4288.5	408.	0.
934.	697.1	4289.1	166.	0.
933.	696.6	4289.6	15.	0.
932.	696.0	4290.4	0.	0.
9[illegible]2.	695.4	4291.2	0.	0.
931.	695.0	4291.6	15.	0.
931.	694.7	4292.1	45.	0.
930.	694.3	4292.6	106.	0.
930.	693.9	4293.0	15.	0.
930.	693.1	4293.7	0.	0.
929.	692.3	4294.4	0.	0.
928.	691.7	4294.8	30.	0.
928.	69[illegible].1	4295.3	0.	0.

31 JULY 74 EVENT 7.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
941.	704.8	4282.6	0.	0.
942.	703.7	4282.7	0.	0.
943.	702.4	4282.9	30.	0.
944.	702.3	4282.2	30.	0.
945.	702.6	4281.2	45.	0.
946.	702.8	4280.0	15.	0.
947.	702.9	4279.5	15.	0.
948.	703.0	4278.9	15.	0.
948.	703.5	4278.6	15.	0.
949.	703.7	4278.2	0.	0.
949.	703.9	4277.5	60.	0.
950.	704.4	4276.7	151.	0.
951.	704.7	4275.5	613.	0.
951.	705.1	4275.0	196.	0.
952.	705.5	4274.4	91.	0.
953.	705.7	4273.9	45.	0.
953.	705.6	4273.2	30.	0.
954.	705.3	4272.1	0.	0.
955.	705.3	4270.6	15.	0.
956.	705.3	4270.4	45.	0.

31 JULY 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1008.	702.9	4279.5	0.	0.
1007.	702.9	4279.3	0.	0.
1007.	703.0	4279.1	0.	0.
1007.	703.0	4278.9	30.	0.
1007.	703.2	4278.8	0.	0.
1007.	703.3	4278.7	0.	0.
1006.	703.5	4278.6	0.	0.
1006.	703.6	4278.5	15.	0.
1006.	703.6	4278.3	15.	0.
1006.	703.7	4278.2	60.	0.
1006.	703.7	4278.0	30.	0.
1006.	703.8	4277.7	60.	0.
1005.	703.9	4277.5	181.	0.
1005.	704.1	4277.2	302.	0.
1005.	704.2	4276.9	468.	0.
1005.	704.4	4276.7	555.	0.
1004.	704.5	4276.3	453.	0.
1004.	704.6	4275.9	534.	0.
1004.	704.7	4275.5	317.	0.
1003.	704.8	4275.4	272.	0.
1003.	705.0	4275.2	242.	0.
1003.	705.1	4275.0	211.	0.
1003.	705.2	4274.8	136.	0.
1003.	705.3	4274.6	106.	0.
1002.	705.5	4274.4	91.	0.
1002.	705.5	4274.3	75.	0.
1002.	705.6	4274.1	60.	0.
1002.	705.7	4273.9	45.	0.
1002.	705.7	4273.7	45.	0.
1001.	705.6	4273.4	15.	0.
1001.	705.6	4273.2	30.	0.
1001.	705.5	4272.8	0.	0.
1000.	705.4	4272.4	15.	0.
1000.	705.3	4272.1	15.	0.
959.	705.3	4271.6	15.	0.
959.	705.3	4271.1	15.	0.
959.	705.3	4270.6	30.	0.
958.	705.3	4270.6	15.	0.
958.	705.3	4270.5	30.	0.
957.	705.3	4270.4	60.	0.

31 JULY 74 EVENT 10.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1021.	702.9	4279.5	30.	0.
1021.	703.0	4279.2	30.	0.
1021.	703.0	4278.9	45.	0.
1022.	703.3	4278.7	45.	0.
1022.	703.5	4278.6	30.	0.
1022.	703.6	4278.4	30.	0.
1023.	703.7	4278.2	15.	0.
1023.	703.8	4277.8	15.	0.
1023.	703.9	4277.5	15.	0.
1023.	704.1	4277.1	45.	0.
1024.	704.4	4276.7	166.	0.
1024.	704.5	4276.1	453.	0.
1025.	704.7	4275.5	814.	0.
1025.	704.9	4275.3	954.	0.
1025.	705.1	4275.0	726.	0.
1026.	705.3	4274.7	468.	0.
1026.	705.5	4274.4	347.	0.
1026.	705.6	4274.2	347.	0.
1027.	705.7	4273.9	272.	0.
1027.	705.6	4273.6	347.	0.
1027.	705.6	4273.2	302.	0.
1028.	705.4	4272.6	166.	0.
1028.	705.3	4272.1	106.	0.
1029.	705.3	4271.4	60.	0.
1029.	705.3	4270.6	45.	0.
1030.	705.3	4270.5	45.	0.
1030.	705.3	4270.4	45.	0.
1030.	705.4	4270.1	60.	0.
1031.	705.5	4269.8	45.	0.

31 JULY 74 EVENT 11.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1041.	702.9	4279.5	0.	0.
1041.	703.0	4279.2	15.	0.
1041.	703.0	4278.9	0.	0.
1041.	703.3	4278.7	15.	0.
1040.	703.5	4278.6	15.	0.
1040.	703.6	4278.4	0.	0.
1040.	703.7	4278.2	45.	0.
1040.	703.8	4277.8	60.	0.
1039.	703.9	4277.5	121.	0.
1039.	704.1	4277.1	181.	0.
1039.	704.4	4276.7	332.	0.
1038.	704.5	4276.1	453.	0.
1038.	704.7	4275.5	821.	0.
1037.	704.9	4275.3	628.	0.
1037.	705.1	4275.0	483.	0.
1037.	705.3	4274.7	332.	0.
1036.	705.5	4274.4	317.	0.
1036.	705.6	4274.2	393.	0.
1036.	705.7	4273.9	362.	0.
1036.	705.6	4273.6	332.	0.
1035.	705.6	4273.2	136.	0.
1035.	705.4	4272.6	91.	0.
1034.	705.3	4272.1	91.	0.
1034.	705.3	4271.4	30.	0.
1033.	705.3	4270.6	45.	0.
1033.	705.3	4270.5	30.	0.
1032.	705.3	4270.4	45.	0.
1032.	705.4	4270.1	60.	0.
1032.	705.5	4269.8	45.	0.

31 JULY 74 EVENT 13.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1052.	712.5	4280.9	15.	0.
1052.	712.3	4280.5	15.	0.
1053.	712.0	4280.2	0.	0.
1054.	711.6	4279.3	0.	0.
1054.	711.2	4278.5	60.	0.
1055.	711.0	4278.2	75.	0.
1055.	710.7	4277.8	91.	0.
1055.	710.7	4277.5	151.	0.
1056.	710.6	4277.2	166.	0.
1056.	710.4	4276.9	393.	0.
1056.	710.3	4276.6	612.	0.
1057.	710.3	4276.0	650.	0.
1057.	710.3	4275.4	302.	0.
1058.	710.3	4274.3	196.	0.
1101.	710.3	4273.3	362.	0.
1102.	710.6	4272.5	91.	0.
1104.	710.9	4271.6	15.	0.

31 JULY 74 EVENT 14.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1115.	712.5	4280.9	15.	0.
1115.	712.4	4280.7	30.	0.
1115.	712.3	4280.5	30.	0.
1115.	712.2	4280.4	30.	0.
1115.	712.0	4280.2	15.	0.
1114.	711.8	4279.8	45.	0.
1114.	711.6	4279.3	45.	0.
1113.	711.4	4278.9	121.	0.
1113.	711.2	4278.5	136.	0.
1113.	711.1	4278.3	166.	0.
1112.	711.0	4278.2	151.	0.
1112.	710.8	4278.0	226.	0.
1112.	710.7	4277.8	257.	0.
1112.	710.7	4277.7	242.	0.
1112.	710.7	4277.5	287.	0.
1112.	710.6	4277.4	272.	0.
1112.	710.6	4277.2	347.	0.
1111.	710.5	4277.1	347.	0.
1111.	710.4	4276.9	302.	0.
1111.	710.4	4276.8	347.	0.
1111.	710.3	4276.6	377.	0.
1111.	710.3	4276.3	362.	0.
1111.	710.3	4276.0	257.	0.
1110.	710.3	4275.7	211.	0.
1110.	710.3	4275.4	302.	0.
1110.	710.3	4274.9	362.	0.
1109.	710.3	4274.3	272.	0.
1109.	710.3	4273.8	559.	0.
1108.	710.3	4273.3	121.	0.
1107.	710.5	4272.9	75.	0.
1106.	710.6	4272.5	45.	0.
1106.	710.8	4272.0	15.	0.
1105.	710.9	4271.6	0.	0.

31 JULY 74 EVENT 15.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1118.	716.5	4279.7	0.	0.
1117.	715.5	4280.0	0.	0.
1116.	714.1	4280.4	0.	0.
1115.	712.5	4280.8	30.	0.

31 JULY 74 EVENT 15.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1119.	716.6	4279.7	0.	0.
1120.	716.5	4279.4	15.	0.
1120.	716.5	4279.1	30.	0.
1120.	716.4	4278.8	30.	0.
1121.	716.4	4278.4	60.	0.
1121.	716.4	4278.1	166.	0.
1122.	716.3	4277.7	438.	0.
1122.	716.5	4277.5	513.	0.
1122.	716.6	4277.3	423.	0.
1123.	716.7	4277.2	453.	0.
1123.	716.7	4276.9	362.	0.
1123.	716.7	4276.7	393.	0.
1123.	716.7	4276.4	453.	0.
1123.	716.7	4276.2	393.	0.
1124.	716.8	4276.0	347.	0.
1124.	716.9	4275.8	302.	0.
1124.	716.9	4275.7	287.	0.
1124.	717.0	4275.6	302.	0.
1124.	717.0	4275.5	317.	0.
1124.	717.0	4275.1	257.	0.
1125.	717.0	4274.6	287.	0.
1125.	717.1	4274.2	181.	0.
1126.	717.1	4273.8	181.	0.
1126.	717.1	4273.5	302.	0.
1126.	717.2	4273.1	226.	0.
1127.	717.3	4273.0	181.	0.
1127.	717.5	4272.8	106.	0.
1127.	717.7	4272.7	75.	0.
1128.	717.8	4272.3	75.	0.
1128.	718.0	4271.8	45.	0.
1129.	718.2	4271.4	60.	0.
1129.	718.3	4271.0	30.	0.
1130.	718.4	4270.7	30.	0.
1130.	718.5	4270.3	30.	0.
1130.	718.5	4270.1	45.	0.
1131.	718.5	4269.9	15.	0.
1131.	718.4	4269.7	15.	0.
1131.	718.4	4269.5	30.	0.
1131.	718.4	4269.3	15.	0.
1132.	718.4	4269.1	15.	0.

31 JULY 74 EVENT 16.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1133.	718.4	4269.3	15.	0.
1132.	718.4	4269.1	15.	0.

31 JULY 74 EVENT 16.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1145.	716.6	4279.7	0.	0.
1145.	716.5	4279.5	91.	0.
1145.	716.5	4279.3	181.	0.
1145.	716.4	4279.1	166.	0.
1144.	716.4	4278.8	166.	0.
1144.	716.4	4278.5	60.	0.
1144.	716.4	4278.2	166.	0.
1143.	716.4	4278.0	302.	0.
1143.	716.3	4277.7	347.	0.
1143.	716.4	4277.5	423.	0.
1142.	716.5	4277.4	302.	0.
1142.	716.6	4277.3	272.	0.
1142.	716.7	4277.2	317.	0.
1142.	716.7	4277.0	287.	0.
1142.	716.7	4276.8	226.	0.
1142.	716.7	4276.6	287.	0.
1141.	716.7	4276.4	226.	0.
1141.	716.7	4276.3	287.	0.
1141.	716.8	4276.1	181.	0.
1141.	716.9	4275.9	181.	0.
1141.	716.9	4275.8	226.	0.
1141.	716.9	4275.7	272.	0.
1140.	717.0	4275.6	257.	0.
1140.	717.0	4275.6	287.	0.
1140.	717.0	4275.5	347.	0.
1140.	717.0	4275.2	211.	0.
1140.	717.0	4274.8	317.	0.
1139.	717.0	4274.5	75.	30.
1139.	717.1	4274.2	106.	0.
1139.	717.1	4273.9	75.	0.
1138.	717.1	4273.6	91.	0.
1138.	717.1	4273.4	60.	0.
1138.	717.2	4273.1	60.	32.
1138.	717.3	4273.0	60.	0.
1138.	717.4	4272.9	30.	0.
1137.	717.5	4272.8	30.	0.
1137.	717.7	4272.7	45.	0.
1137.	717.8	4272.4	45.	0.
1137.	717.9	4272.0	75.	0.
1136.	718.0	4271.7	60.	0.
1136.	718.2	4271.4	45.	72.
1135.	718.3	4271.1	30.	0.
1134.	718.3	4270.8	45.	0.
1134.	718.4	4270.6	45.	0.
1134.	718.5	4270.3	30.	0.
1133.	718.5	4270.1	60.	0.
1133.	718.5	4270.0	45.	0.
1133.	718.5	4269.8	30.	0.
1133.	718.4	4269.7	30.	0.
1133.	718.4	4269.5	45.	0.
1133.	718.4	4269.4	30.	0.

31 JULY 74 EVENT 17.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1152.	716.6	4279.7	30.	0.
1152.	716.5	4279.5	30.	0.
1153.	716.5	4279.3	15.	0.
1153.	716.4	4279.1	45.	0.
1153.	716.4	4278.8	45.	0.
1153.	716.4	4278.5	75.	0.
1153.	716.4	4278.2	166.	0.
1154.	716.4	4278.0	136.	0.
1155.	716.3	4277.7	136.	0.
1155.	716.4	4277.5	121.	0.
1155.	716.5	4277.4	136.	0.
1155.	716.6	4277.3	121.	0.
1156.	716.7	4277.2	91.	0.
1156.	716.7	4277.0	106.	0.
1156.	716.7	4276.8	91.	0.
1156.	716.7	4276.6	106.	0.
1156.	716.7	4276.4	106.	0.
1156.	716.7	4276.3	106.	0.
1156.	716.8	4276.1	106.	0.
1156.	716.9	4275.9	91.	0.
1156.	716.9	4275.8	106.	0.
1157.	716.9	4275.7	106.	0.
1157.	717.0	4275.6	106.	0.
1157.	717.0	4275.6	136.	0.
1157.	717.0	4275.5	166.	0.
1157.	717.0	4275.2	151.	28.
1158.	717.0	4274.8	121.	1.
1158.	717.0	4274.5	106.	58.
1158.	717.1	4274.2	75.	0.
1200.	717.1	4273.9	75.	12.
1200.	717.1	4273.6	91.	0.
1201.	717.1	4273.4	91.	3.
1201.	717.2	4273.1	91.	11.
1201.	717.3	4273.0	106.	16.
1201.	717.4	4272.9	91.	15.
1202.	717.5	4272.8	30.	4.
1202.	717.7	4272.7	30.	0.
1202.	717.8	4272.4	15.	0.
1202.	717.9	4272.0	0.	0.
1203.	718.0	4271.7	0.	0.
1203.	718.2	4271.4	0.	0.
1204.	718.3	4271.1	0.	0.
1204.	718.3	4270.8	0.	0.
1204.	718.4	4270.6	0.	0.
1205.	718.5	4270.3	0.	0.
1205.	718.5	4270.1	0.	0.
1205.	718.5	4270.0	0.	0.
1205.	718.5	4269.8	0.	0.
1205.	718.4	4269.7	0.	0.
1205.	718.4	4269.5	0.	0.
1205.	718.4	4269.4	0.	0.

31 JULY 74 EVENT 17.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1205.	718.4	4269.3	0.	0.
1206.	718.4	4269.1	0.	0.
1206.	718.4	4269.1	0.	0.
1206.	718.4	4269.0	0.	0.
1206.	718.3	4268.9	0.	0.
1206.	718.3	4268.8	0.	0.
1207.	718.3	4268.6	0.	0.
1207.	718.3	4268.4	0.	0.
1207.	718.3	4268.2	0.	0.
1207.	718.3	4268.0	0.	0.

31 JULY 74 EVENT 19.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1312.	721.9	4283.1	0.	0.
1311.	721.9	4282.1	0.	0.
1310.	721.9	4281.2	15.	0.
1310.	721.9	4280.6	0.	0.
1309.	721.9	4279.9	0.	0.
1309.	721.9	4279.6	0.	0.
1309.	721.9	4279.3	0.	0.
1308.	721.9	4278.7	15.	0.
1308.	721.9	4278.0	15.	0.
1308.	721.9	4277.2	15.	0.
1307.	721.9	4276.3	30.	0.
1307.	721.9	4275.8	45.	0.
1306.	722.0	4275.3	75.	56.
1306.	722.1	4274.8	75.	54.
1305.	722.2	4274.3	91.	47.
1305.	722.2	4273.6	121.	58.
1305.	722.3	4273.0	121.	56.
1304.	722.5	4272.5	91.	46.
1304.	722.6	4272.1	106.	50.
1304.	722.8	4271.8	106.	26.
1303.	722.9	4271.4	75.	30.
1303.	723.0	4271.1	91.	24.
1303.	723.2	4270.8	75.	24.
1302.	723.6	4270.3	60.	20.
1302.	723.9	4269.7	60.	4.
1302.	724.1	4269.5	75.	12.
1300.	724.2	4269.3	75.	10.

31 JULY 74 EVENT 20.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1318.	721.9	4283.1	0.	0.
1320.	721.9	4281.2	0.	0.
1321.	721.9	4279.9	0.	0.
1321.	721.9	4279.3	0.	0.
1322.	721.9	4278.0	0.	0.
1323.	721.9	4276.3	30.	0.
1324.	722.0	4275.3	45.	0.
1324.	722.2	4274.3	45.	0.
1325.	722.3	4273.0	60.	22.
1326.	722.6	4272.1	91.	35.
1326.	722.9	4271.4	91.	36.
1327.	723.2	4270.8	91.	34.
1328.	723.9	4269.7	75.	22.
1328.	724.2	4269.3	75.	20.
1329.	724.8	4268.6	91.	30.
1329.	725.7	4268.0	60.	20.
1330.	726.7	4267.2	75.	36.
1331.	727.1	4266.9	45.	33.

31 JULY 74 EVENT 20.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1331.	727.1	4266.9	45.	33.
1332.	726.8	4266.8	45.	0.
1332.	724.8	4266.0	0.	0.
1333.	724.0	4265.8	0.	0.
1333.	723.4	4265.8	0.	0.
1334.	722.7	4265.4	0.	0.

31 JULY 74 EVENT 21.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1342.	727.1	4266.9	45.	0.
1341.	726.8	4266.8	45.	0.
1341.	724.8	4266.0	15.	0.
1341.	724.0	4265.8	0.	0.

31 JULY 74 EVENT 21.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1349.	722.0	4275.3	0.	0.
1348.	722.1	4274.8	0.	0.
1348.	722.2	4274.3	15.	0.
1347.	722.2	4273.6	30.	0.
1347.	722.3	4273.0	30.	0.
1347.	722.5	4272.5	30.	16.
1346.	722.6	4272.1	30.	20.
1346.	722.8	4271.8	15.	26.
1346.	722.9	4271.4	30.	11.
1346.	723.0	4271.1	45.	22.
1345.	723.2	4270.8	60.	21.
1345.	723.6	4270.3	45.	30.
1344.	723.9	4269.7	30.	6.
1344.	724.1	4269.5	60.	14.
1344.	724.2	4269.3	45.	22.
1344.	724.5	4269.0	45.	1.
1343.	724.8	4268.6	45.	4.
1344.	725.2	4268.3	45.	10.
1343.	725.7	4268.0	60.	5.
1343.	726.2	4267.6	45.	0.
1342.	726.7	4267.2	30.	16.
1342.	726.9	4267.0	45.	0.
1342.	727.1	4266.9	45.	0.

31 JULY 74 EVENT 22.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1349.	722.0	4275.3	0.	0.
1349.	722.1	4274.8	15.	0.
1350.	722.2	4274.3	0.	0.
1350.	722.2	4273.6	0.	0.
1350.	722.3	4273.0	0.	0.
1351.	722.5	4272.5	15.	0.
1351.	722.6	4272.1	15.	0.
1351.	722.8	4271.8	15.	4.
1351.	722.9	4271.4	0.	40.
1352.	723.0	4271.1	15.	44.
1352.	723.2	4270.8	30.	24.
1352.	723.6	4270.3	15.	1.
1353.	723.9	4269.7	30.	13.
1353.	724.1	4269.5	45.	16.
1353.	724.2	4269.3	60.	0.
1353.	724.5	4269.0	45.	0.
1354.	724.8	4268.6	45.	11.
1354.	725.2	4268.3	45.	24.
1354.	725.7	4268.0	0.	0.
1354.	726.2	4267.6	45.	2.
1355.	726.7	4267.2	45.	8.
1355.	726.9	4267.0	30.	6.
1356.	727.1	4266.9	30.	0.
1357.	727.8	4266.3	30.	0.
1357.	728.5	4265.8	45.	0.
1358.	728.8	4265.5	45.	0.
1358.	729.2	4265.3	45.	0.
1358.	730.3	4264.8	60.	0.
1359.	731.3	4264.4	106.	20.
1359.	731.6	4264.3	121.	48.
1400.	731.8	4264.2	106.	38.

31 JULY 74 EVENT 22.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1400.	731.9	4264.3	106.	38.
1400.	731.7	4264.0	91.	12.
1400.	731.5	4263.7	75.	8.
1400.	731.4	4263.5	75.	0.
1400.	731.2	4263.3	75.	0.
1401.	731.0	4262.8	75.	6.
1401.	730.7	4262.4	60.	0.
1402.	729.8	4261.0	30.	0.
1403.	729.0	4259.6	15.	0.
1403.	728.9	4259.2	0.	0.
1403.	728.7	4258.7	0.	0.
1404.	728.6	4258.0	15.	0.
1404.	728.5	4257.3	0.	0.
1404.	728.4	4257.0	0.	0.
1405.	728.4	4256.7	0.	0.
1405.	728.2	4256.1	0.	46.
1405.	728.1	4255.5	15.	66.
1406.	727.9	4255.0	0.	50.
1406.	727.7	4254.4	0.	0.
1406.	728.0	4253.3	0.	0.
1407.	728.2	4252.1	15.	0.
1407.	728.2	4251.1	15.	0.
1408.	728.3	4250.1	15.	0.
1409.	728.2	4249.8	121.	100.
1410.	728.2	4249.4	45.	168.
1410.	727.9	4248.7	45.	140.
1410.	727.6	4248.1	75.	150.
1413.	727.4	4247.6	166.	265.
1414.	727.2	4247.1	166.	235.
1414.	726.9	4245.8	226.	220.
1414.	726.7	4244.6	151.	165.
1415.	726.6	4243.9	91.	90.
1416.	726.6	4243.3	45.	30.
1417.	726.6	4242.5	45.	0.
1417.	726.5	4241.7	60.	0.
1418.	726.7	4240.9	45.	0.
1418.	726.9	4240.1	45.	0.

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31 JULY 74 EVENT 23.02

TIME (CDT)	X (KM)	Y (KM)	S02-TR (PPM-M)	S02-GL (PPB)
1443.	731.9	4264.3	91.	38.
1443.	731.5	4263.7	60.	18.
1442.	731.2	4263.3	60.	2.
1442.	730.7	4262.4	75.	0.
1439.	729.0	4259.6	30.	0.
1438.	728.7	4258.7	30.	0.
1437.	728.5	4257.3	30.	0.
1437.	728.4	4256.7	15.	0.
1436.	728.1	4255.5	0.	0.
1435.	727.7	4254.4	30.	0.

31 JULY 74 EVENT 23.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1501.	721.9	4285.9	0.	0.
1500.	721.9	4284.3	0.	0.
1459.	721.9	4283.1	0.	0.
1458.	721.9	4281.2	30.	0.
1457.	721.9	4279.9	15.	0.
1457.	721.9	4279.3	15.	0.
1456.	721.9	4278.0	0.	0.
1455.	721.9	4276.3	0.	0.
1454.	722.0	4275.3	15.	0.
1453.	722.2	4274.3	15.	0.
1453.	722.3	4273.0	15.	0.
1452.	722.6	4272.1	45.	0.
1451.	722.9	4271.4	30.	0.
1451.	723.2	4270.8	30.	0.
1450.	723.9	4269.7	15.	0.
1450.	724.2	4269.3	30.	0.
1449.	724.8	4268.6	30.	0.
1449.	725.7	4268.0	15.	0.
1448.	726.7	4267.2	30.	0.
1448.	727.1	4266.9	30.	0.
1446.	728.5	4265.8	30.	0.
1446.	729.2	4265.3	45.	35.
1444.	731.3	4264.4	91.	80.
1443.	731.8	4264.2	91.	38.

1 AUG 74 EVENT 2.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
823.	731.4	4278.5	0.	0.
825.	731.0	4278.5	15.	0.
826.	729.7	4278.6	0.	0.
827.	728.7	4278.7	0.	0.
828.	727.6	4278.7	0.	0.
828.	726.9	4279.1	30.	0.
829.	725.9	4279.1	15.	0.
830.	725.1	4279.1	15.	0.
831.	722.5	4279.3	0.	0.
831.	721.9	4279.3	0.	0.
832.	720.5	4279.3	0.	0.

1 AUG 74 EVENT 2.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
832.	720.5	4279.3	0.	0.
832.	720.2	4279.3	0.	0.
832.	719.9	4279.3	15.	0.
832.	719.6	4279.2	15.	0.
833.	719.3	4279.2	0.	0.
833.	719.0	4279.2	15.	0.
833.	718.8	4279.2	15.	0.
833.	718.6	4279.3	30.	0.
833.	718.3	4279.3	30.	0.
834.	717.9	4279.4	15.	0.
834.	717.4	4279.5	15.	0.
834.	717.0	4279.6	30.	0.
835.	716.5	4279.7	45.	0.
835.	716.3	4279.8	30.	0.
835.	716.0	4279.9	30.	0.
835.	715.8	4279.9	45.	0.
835.	715.5	4280.0	75.	0.
836.	715.1	4280.1	91.	0.
836.	714.8	4280.2	30.	0.
836.	714.4	4280.3	106.	0.
836.	714.1	4280.4	60.	0.
836.	713.7	4280.5	60.	0.
837.	713.3	4280.6	15.	0.
837.	712.9	4280.7	75.	0.
837.	712.5	4280.8	181.	0.
838.	712.3	4281.1	45.	0.
838.	712.1	4281.4	91.	0.
838.	711.8	4281.6	91.	0.
838.	711.6	4281.9	60.	0.
838.	711.5	4281.9	60.	0.
838.	711.4	4282.0	30.	0.
839.	711.3	4282.0	60.	0.
839.	711.2	4282.1	91.	0.
839.	711.0	4282.1	45.	0.
839.	710.9	4282.2	75.	0.
839.	710.8	4282.3	30.	0.
839.	710.6	4282.4	75.	0.
840.	710.1	4282.5	91.	0.
840.	709.6	4282.5	45.	0.
840.	709.0	4282.6	15.	0.
840.	708.5	4282.7	0.	0.
841.	708.3	4282.7	15.	0.
841.	708.0	4282.7	30.	0.
841.	707.8	4282.7	15.	0.
841.	707.6	4282.8	30.	0.
841.	707.2	4282.8	30.	0.
841.	706.9	4282.8	0.	0.
842.	706.6	4282.9	15.	0.
842.	706.3	4282.9	0.	0.
842.	705.9	4282.9	0.	0.
842.	705.6	4283.0	0.	0.

1 AUG 74 EVENT 2.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
842.	705.2	4283.0	0.	0.
842.	704.8	4283.1	0.	0.
843.	704.7	4283.1	0.	0.
843.	704.5	4283.2	0.	0.
843.	704.3	4283.2	0.	0.
843.	704.2	4283.3	30.	0.

1 AUG 74 EVENT 3.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
846.	704.8	4282.6	0.	0.
846.	704.4	4282.7	0.	0.
847.	704.0	4282.7	0.	0.
847.	703.7	4282.7	0.	0.
847.	703.3	4282.8	15.	0.
848.	702.8	4282.8	15.	0.
848.	702.4	4282.9	15.	0.
848.	702.4	4282.6	0.	0.
849.	702.4	4282.4	15.	0.
849.	702.3	4282.2	30.	0.
849.	702.4	4281.8	15.	0.
850.	702.5	4281.5	45.	0.
850.	702.6	4281.2	0.	0.
850.	702.7	4280.8	30.	0.
850.	702.8	4280.4	0.	0.
851.	702.8	4280.0	0.	0.
852.	702.9	4279.8	15.	0.
852.	702.9	4279.6	0.	0.
853.	702.9	4279.5	15.	0.
854.	702.9	4279.3	15.	0.
854.	703.0	4279.1	30.	0.
854.	703.0	4278.9	30.	0.
854.	703.2	4278.8	30.	0.
854.	703.3	4278.7	45.	0.
854.	703.5	4278.6	30.	0.
854.	703.6	4278.5	15.	0.
854.	703.6	4278.3	30.	0.
854.	703.7	4278.2	30.	0.
855.	703.7	4278.0	30.	0.
855.	703.8	4277.7	30.	0.
855.	703.9	4277.5	30.	0.
855.	704.1	4277.2	30.	0.
855.	704.2	4276.9	45.	0.
855.	704.4	4276.7	30.	0.
856.	704.5	4276.3	30.	0.
856.	704.6	4275.9	91.	0.
856.	704.7	4275.5	91.	0.
857.	704.8	4275.4	45.	0.
857.	705.0	4275.2	106.	0.
857.	705.1	4275.0	60.	0.
857.	705.2	4274.8	75.	0.
858.	705.3	4274.6	91.	0.
858.	705.5	4274.4	45.	0.
858.	705.5	4274.3	106.	0.
858.	705.6	4274.1	60.	0.
858.	705.7	4273.9	136.	0.
859.	705.7	4273.7	75.	0.
859.	705.6	4273.4	136.	0.
859.	705.6	4273.2	91.	0.
859.	705.5	4272.8	136.	0.
900.	705.4	4272.4	151.	0.

1 AUG 74 EVENT 3.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
900.	705.3	4272.1	106.	0.
900.	705.3	4271.6	75.	0.
901.	705.3	4271.1	106.	0.
901.	705.3	4270.6	60.	0.
901.	705.3	4270.6	45.	0.
902.	705.3	4270.5	15.	0.
902.	705.3	4270.4	15.	0.
903.	705.4	4270.2	30.	0.
903.	705.4	4270.0	15.	0.
903.	705.5	4269.8	0.	0.
903.	705.6	4269.6	15.	0.
903.	705.7	4269.5	15.	0.
903.	705.7	4269.3	0.	0.
904.	705.9	4269.2	45.	0.
904.	706.1	4269.1	0.	0.
904.	706.3	4269.0	0.	0.

1 AUG 74 EVENT 4.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TH (PPM-M)	SO2-GL (PPB)
921.	704.8	4283.1	0.	0.
921.	704.8	4282.9	0.	0.
921.	704.8	4282.6	0.	0.
920.	704.2	4282.7	0.	0.
920.	703.7	4282.7	0.	0.
919.	703.1	4282.8	0.	0.
919.	702.4	4282.9	15.	0.
918.	702.4	4282.5	15.	0.
918.	702.3	4282.2	0.	0.
918.	702.5	4281.7	0.	0.
917.	702.6	4281.2	15.	0.
917.	702.7	4280.6	15.	0.
916.	702.8	4280.0	45.	0.
915.	702.9	4279.7	15.	0.
915.	702.9	4279.5	15.	0.
914.	703.0	4279.2	30.	0.
914.	703.0	4278.9	30.	0.
914.	703.3	4278.7	30.	0.
914.	703.5	4278.6	60.	0.
914.	703.6	4278.4	30.	0.
913.	703.7	4278.2	60.	0.
913.	703.8	4277.8	60.	0.
913.	703.9	4277.5	45.	0.
913.	704.1	4277.1	30.	0.
912.	704.4	4276.7	91.	0.
912.	704.5	4276.1	106.	0.
912.	704.7	4275.5	60.	0.
911.	704.9	4275.3	106.	0.
911.	705.1	4275.0	151.	0.
911.	705.3	4274.7	91.	0.
910.	705.5	4274.4	60.	0.
910.	705.6	4274.2	136.	0.
910.	705.7	4273.9	60.	0.
910.	705.6	4273.6	136.	0.
909.	705.6	4273.2	181.	0.
909.	705.4	4272.6	91.	0.
908.	705.3	4272.1	60.	0.
908.	705.3	4271.4	75.	0.
907.	705.3	4270.6	45.	0.
907.	705.3	4270.5	30.	0.
907.	705.3	4270.4	45.	0.
906.	705.4	4270.1	30.	0.
906.	705.5	4269.8	0.	0.
906.	705.6	4269.5	0.	0.
906.	705.7	4269.3	0.	0.
905.	706.0	4269.2	0.	0.
905.	706.3	4269.0	0.	0.

1 AUG 74 EVENT 4.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
922.	704.8	4283.1	0.	0.
922.	704.2	4283.3	0.	0.
923.	703.5	4284.1	0.	0.
923.	703.3	4284.9	0.	0.
924.	703.0	4285.4	0.	0.
925.	702.1	4286.6	0.	0.

1 AUG 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
929.	704.8	4283.1	0.	0.
929.	704.2	4283.3	0.	0.
928.	703.5	4284.1	0.	0.
928.	703.3	4284.9	15.	0.
927.	703.0	4285.4	0.	0.
926.	702.1	4286.6	0.	0.

1 AUG 74 EVENT 5.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
930.	704.8	4283.1	0.	0.
930.	704.8	4282.6	0.	0.
930.	703.7	4282.7	0.	0.
932.	702.4	4282.9	15.	0.
933.	702.3	4282.2	0.	0.
934.	702.6	4281.2	15.	0.
935.	702.8	4280.0	30.	0.
936.	702.9	4279.5	0.	0.

1 AUG 74 EVENT 6.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1012.	706.7	4268.4	137.	58.
1012.	706.6	4268.0	91.	60.
1012.	706.4	4267.6	99.	45.
1011.	706.3	4267.3	76.	84.
1011.	706.4	4266.8	76.	48.
1011.	706.6	4266.4	76.	0.
1010.	706.7	4265.9	53.	0.
1010.	706.9	4265.5	53.	0.
1010.	707.0	4265.1	46.	0.
1009.	707.2	4264.7	38.	0.
1008.	707.1	4264.7	46.	0.
1008.	707.0	4264.7	30.	0.
1007.	707.0	4264.7	30.	0.
1007.	707.0	4264.6	46.	0.
1007.	707.0	4264.5	30.	0.
1007.	707.0	4264.3	46.	0.
1007.	707.0	4264.2	46.	0.
1007.	707.0	4264.1	30.	0.
1007.	707.0	4263.9	23.	0.
1007.	707.0	4263.8	23.	0.
1006.	707.0	4263.6	38.	0.
1006.	706.9	4263.4	8.	0.
1006.	706.8	4263.4	23.	0.
1006.	706.7	4263.3	30.	0.
1006.	706.6	4263.3	30.	0.
1005.	706.6	4263.0	38.	0.
1005.	706.6	4262.8	15.	0.
1005.	706.5	4262.5	15.	0.
1005.	706.5	4262.3	8.	0.
1005.	706.5	4262.0	8.	0.
1005.	706.4	4261.8	15.	0.
1005.	706.3	4261.5	15.	0.
1004.	706.2	4261.2	15.	0.
1004.	706.1	4261.0	23.	0.

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        1   AUG  74   EVENT    6.01


   TIME       X          Y        SO2-TR   SO2-GL
   (CDT)    (KM)       (KM)     (PPM-M)    (PPB)


   1024.   702.9     4279.5       0.         0.
   1024.   702.9     4279.3       0.         0.
   1023.   703.0     4279.1       0.         0.
   1023.   703.0     4278.9       0.         0.
   1023.   703.2     4278.8       0.         0.
   1023.   703.3     4278.7       8.         0.
   1023.   703.5     4278.6       0.         0.
   1023.   703.6     4278.5       8.         0.
   1023.   703.6     4278.3       0.         0.
   1022.   703.7     4278.2      15.         0.
   1022.   703.7     4278.0       8.         0.
   1022.   703.8     4277.7       0.         0.
   1022.   703.9     4277.5       0.         0.
   1022.   704.1     4277.2       0.         0.
   1021.   704.2     4276.9       0.         0.
   1021.   704.4     4276.7      15.         0.
   1021.   704.5     4276.3       0.         0.
   1021.   704.6     4275.9       8.         0.
   1020.   704.7     4275.5      15.         0.
   1020.   704.8     4275.4       0.         0.
   1021.   705.0     4275.2       8.         0.
   1021.   705.1     4275.0       0.         0.
   1020.   705.2     4274.8       0.         0.
   1019.   705.3     4274.6       8.         0.
   1019.   705.5     4274.4       8.         0.
   1019.   705.5     4274.3       0.         0.
   1019.   705.6     4274.1      23.         0.
   1019.   705.7     4273.9      15.         0.
   1018.   705.7     4273.7       0.         0.
   1018.   705.6     4273.4      30.         0.
   1018.   705.6     4273.2      15.         0.
   1018.   705.5     4272.8      23.         0.
   1017.   705.4     4272.4      23.         0.
   1016.   705.3     4272.1      23.        42.
   1016.   705.3     4271.6      46.        35.
   1015.   705.3     4271.1      38.        90.
   1015.   705.3     4270.6      99.       150.
   1015.   705.3     4270.6      91.       122.
   1015.   705.3     4270.5      84.       137.
   1014.   705.3     4270.4      99.        88.
   1014.   705.4     4270.2     106.        83.
   1014.   705.4     4270.0     122.        83.
   1014.   705.5     4269.8     122.        90.
   1014.   705.6     4269.6     129.        70.
   1013.   705.7     4269.5     122.        61.
   1013.   705.7     4269.3     114.        56.
   1013.   705.9     4269.2      76.        61.
   1013.   706.1     4269.1     106.        73.
   1013.   706.3     4269.0     160.        72.
   1012.   706.5     4268.8     144.        68.
   1012.   706.6     4268.6     114.        60.
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1 AUG 74 EVENT 7.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1037.	702.9	4279.5	8.	0.
1038.	703.0	4278.9	8.	0.
1038.	703.5	4278.6	15.	0.
1039.	703.7	4278.2	8.	0.
1039.	703.9	4277.5	0.	0.
1040.	704.4	4276.7	8.	0.
1041.	704.7	4275.5	8.	0.
1041.	705.1	4275.0	0.	0.
1042.	705.5	4274.4	8.	0.
1042.	705.7	4273.9	8.	0.
1043.	705.6	4273.2	8.	0.
1044.	705.3	4272.1	0.	0.
1046.	705.3	4270.6	0.	0.

1 AUG 74 EVENT 7.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1046.	705.3	4270.6	0.	0.
1046.	705.3	4270.6	15.	0.
1046.	705.3	4270.5	30.	0.
1047.	705.3	4270.4	38.	0.
1047.	705.4	4270.2	53.	0.
1047.	705.4	4270.0	60.	0.
1047.	705.5	4269.8	75.	22.
1047.	705.6	4269.6	60.	38.
1047.	705.7	4269.5	38.	58.
1048.	705.7	4269.3	60.	52.
1048.	705.9	4269.2	75.	59.
1048.	706.1	4269.1	83.	69.
1048.	706.3	4269.0	98.	64.
1048.	706.5	4268.8	106.	76.
1048.	706.6	4268.6	113.	94.
1048.	706.7	4268.4	121.	105.
1049.	706.6	4268.0	106.	110.
1049.	706.4	4267.6	83.	108.
1049.	706.3	4267.3	45.	124.
1050.	706.4	4266.8	68.	102.
1050.	706.6	4266.4	98.	140.
1050.	706.7	4265.9	143.	88.
1051.	706.9	4265.5	106.	98.
1051.	707.0	4265.1	106.	84.
1051.	707.2	4264.7	151.	86.
1052.	707.1	4264.7	121.	86.
1052.	707.0	4264.7	128.	115.
1052.	707.0	4264.7	106.	138.
1052.	707.0	4264.6	106.	111.
1053.	707.0	4264.5	106.	120.
1053.	707.0	4264.3	98.	140.
1053.	707.0	4264.2	106.	118.
1054.	707.0	4264.1	113.	99.
1054.	707.0	4263.9	113.	106.
1054.	707.0	4263.8	113.	104.
1054.	707.0	4263.6	113.	102.
1054.	706.9	4263.4	113.	100.
1054.	706.8	4263.4	113.	101.
1054.	706.7	4263.3	113.	101.
1054.	706.6	4263.3	106.	102.
1055.	706.6	4263.0	113.	88.
1055.	706.6	4262.8	91.	94.
1055.	706.5	4262.5	106.	80.
1055.	706.5	4262.3	106.	80.
1055.	706.5	4262.0	98.	78.
1056.	706.4	4261.8	83.	73.
1056.	706.3	4261.5	68.	52.
1056.	706.2	4261.2	68.	18.
1056.	706.1	4261.0	60.	6.

1 AUG 74 EVENT 9.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1152.	722.7	4265.4	30.	0.
1151.	722.0	4264.8	91.	0.
1151.	721.3	4264.3	91.	0.
1150.	721.1	4264.0	45.	0.
1150.	720.8	4263.7	106.	0.
1150.	720.4	4263.5	75.	0.
1149.	719.9	4263.2	106.	0.
1149.	719.6	4263.0	91.	0.
1149.	719.2	4262.8	136.	0.
1148.	718.6	4262.3	121.	0.
1147.	717.9	4261.8	60.	0.
1146.	717.2	4261.6	121.	0.
1146.	716.5	4261.3	106.	0.
1145.	716.2	4260.7	75.	0.
1144.	715.9	4260.0	60.	0.
1144.	715.6	4259.8	75.	0.
1143.	715.2	4259.5	30.	0.
1143.	715.0	4259.4	75.	0.
1143.	714.9	4259.2	60.	0.
1143.	714.9	4259.0	45.	0.
1142.	714.8	4258.8	15.	0.
1142.	714.8	4258.7	15.	0.
1142.	714.8	4258.6	30.	0.
1142.	714.6	4258.2	45.	0.
1141.	714.3	4257.8	0.	0.
1141.	714.1	4257.8	60.	0.
1141.	713.8	4257.8	30.	0.
1140.	713.7	4257.4	30.	0.
1139.	713.6	4256.9	15.	0.
1139.	713.6	4256.4	30.	0.
1139.	713.5	4255.9	15.	0.
1138.	713.5	4255.6	15.	0.
1136.	713.5	4255.4	15.	0.
1138.	713.1	4255.0	15.	0.
1137.	712.8	4254.6	0.	0.
1137.	712.4	4254.2	0.	0.
1137.	712.0	4253.7	30.	0.
1137.	711.9	4253.6	0.	0.
1136.	711.7	4253.6	0.	0.
1135.	711.4	4253.6	15.	0.
1135.	711.1	4253.7	0.	0.
1134.	710.7	4253.1	0.	0.
1134.	710.3	4252.6	0.	0.
1133.	709.8	4251.8	0.	0.
1133.	709.3	4251.1	0.	0.
1132.	708.9	4250.6	0.	0.
1131.	708.5	4250.1	0.	0.
1131.	708.2	4250.0	0.	0.
1131.	708.0	4250.0	0.	0.
1131.	707.7	4250.0	0.	0.
1130.	707.3	4250.1	0.	0.

1 AUG 74 EVENT 9.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1213.	716.3	4277.7	0.	0.
1213.	716.5	4277.4	0.	0.
1212.	716.7	4277.2	0.	0.
1212.	716.7	4276.8	0.	0.
1212.	716.7	4276.4	0.	0.
1211.	716.8	4276.1	15.	0.
1211.	716.9	4275.8	0.	0.
1211.	717.0	4275.6	0.	0.
1211.	717.0	4275.5	0.	0.
1210.	717.0	4274.8	0.	0.
1208.	717.1	4274.2	0.	0.
1206.	717.1	4273.6	0.	0.
1206.	717.2	4273.1	0.	0.
1206.	717.4	4272.9	0.	0.
1205.	717.7	4272.7	0.	0.
1204.	717.9	4272.0	0.	0.
1203.	718.2	4271.4	0.	0.
1202.	718.3	4270.8	15.	0.
1201.	718.5	4270.3	15.	0.
1201.	718.5	4270.0	15.	0.
1201.	718.4	4269.7	30.	0.
1200.	718.4	4269.4	45.	0.
1200.	718.4	4269.1	0.	0.
1159.	718.4	4269.0	30.	0.
1158.	718.3	4268.8	15.	0.
1157.	718.3	4268.4	30.	0.
1156.	718.3	4268.0	30.	0.
1156.	718.4	4267.7	106.	0.
1156.	718.4	4267.4	91.	0.
1155.	719.0	4267.0	75.	0.
1155.	719.6	4266.7	60.	0.
1154.	719.9	4266.6	75.	0.
1154.	720.3	4266.5	60.	0.
1154.	720.8	4266.4	75.	0.
1153.	721.3	4266.3	45.	0.
1153.	721.7	4266.1	30.	0.
1152.	722.2	4265.8	30.	0.
1152.	722.5	4265.6	45.	0.
1152.	722.8	4265.4	30.	0.

```
        1   AUG  74   EVENT  11.01


              TIME     X        Y        SO2-TR   SO2-GL
              (CDT)   (KM)     (KM)     (PPM-M)   (PPB)


              1307.  716.3    4277.7      15.       0.
              1307.  716.5    4277.4       0.       0.
              1307.  716.7    4277.2       0.       0.
              1308.  716.7    4276.8      15.       0.
              1308.  716.7    4276.4       8.       0.
              1308.  716.8    4276.1      15.       0.
              1308.  716.9    4275.8       0.       0.
              1309.  717.0    4275.6       0.       0.
              1309.  717.0    4275.5       8.       0.
              1310.  717.0    4274.8       0.       0.
              1311.  717.1    4274.2       8.       0.
```

1 AUG 74 EVENT 11.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1311.	717.1	4274.1	8.	0.
1311.	716.9	4274.1	0.	0.
1312.	716.7	4274.1	0.	0.
1312.	716.6	4274.1	8.	0.
1312.	716.4	4274.1	0.	0.
1312.	716.3	4274.1	0.	0.
1312.	716.1	4274.1	15.	0.
1313.	715.9	4274.1	15.	0.
1313.	715.7	4274.1	15.	0.
1313.	715.0	4274.1	0.	0.
1314.	714.3	4274.1	0.	0.
1314.	714.2	4274.1	15.	0.
1315.	714.0	4274.1	0.	0.
1315.	713.9	4274.1	0.	0.
1315.	713.8	4274.1	0.	0.
1315.	713.5	4274.1	8.	0.
1316.	713.1	4274.1	15.	0.
1316.	712.9	4274.1	23.	0.
1316.	712.8	4274.1	15.	0.
1317.	712.4	4274.1	23.	0.
1317.	712.0	4274.0	15.	0.
1317.	711.8	4274.0	8.	0.
1317.	711.6	4274.0	15.	0.
1318.	711.0	4274.0	30.	0.
1318.	710.3	4274.0	30.	0.
1319.	709.7	4273.7	38.	0.
1319.	709.1	4273.5	46.	0.
1320.	708.7	4273.3	46.	0.
1320.	708.3	4273.2	61.	0.
1320.	708.0	4273.0	76.	0.
1321.	707.8	4272.8	91.	0.
1321.	707.5	4272.7	137.	0.
1321.	707.2	4272.5	99.	0.
1322.	706.6	4272.3	129.	0.
1322.	706.0	4272.0	175.	0.
1323.	705.6	4272.0	236.	116.
1323.	705.2	4272.0	266.	124.
1323.	704.8	4272.3	289.	156.
1324.	704.3	4272.5	266.	149.
1324.	703.8	4272.6	289.	138.
1324.	703.2	4272.8	304.	152.

```
          1   AUG  74   EVENT  11.02


TIME      X          Y        SO2-TB    SO2-GL
(CDT)   (KM)       (KM)      (PPM-M)    (PPB)


1324.   703.2     4272.8     302.       152.
1324.   702.8     4272.8     362.       142.
1325.   702.3     4272.8     317.       128.
1325.   702.2     4272.6     332.       170.
1326.   702.0     4272.4     257.       195.
```

1 AUG 74 EVENT 11.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1326.	702.0	4272.4	257.	195.
1326.	700.7	4272.5	347.	160.
1327.	699.4	4272.5	45.	100.
1328.	698.9	4272.6	0.	40.
1328.	698.4	4272.6	15.	0.
1329.	698.0	4272.3	0.	0.
1329.	697.7	4272.0	75.	0.
1330.	697.1	4272.1	136.	10.
1330.	696.5	4272.1	257.	190.
1330.	696.3	4272.0	423.	300.
1330.	696.1	4271.9	332.	375.
1331.	695.8	4271.8	242.	360.
1331.	695.6	4271.8	121.	425.
1332.	695.6	4271.6	726.	700.
1332.	695.5	4271.4	797.	550.
1332.	694.9	4271.2	629.	600.
1333.	694.4	4271.1	908.	750.
1333.	694.4	4270.8	751.	1106.
1333.	694.3	4270.6	629.	960.
1334.	694.0	4270.3	121.	500.
1335.	693.6	4270.0	75.	190.
1336.	693.0	4269.8	45.	150.
1337.	692.4	4269.5	0.	40.

1 AUG 74 EVENT 12.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1401.	690.0	4270.5	38.	150.
1400.	690.0	4270.7	113.	400.
1400.	690.0	4270.9	188.	315.
1359.	690.0	4271.0	151.	500.
1357.	690.0	4271.2	188.	400.
1357.	689.9	4271.2	339.	350.
1357.	689.8	4271.2	781.	360.
1356.	689.7	4271.2	577.	355.
1356.	689.6	4271.2	954.	340.
1356.	689.6	4271.3	2018.	380.
1356.	689.6	4271.4	>3000.	215.
1355.	689.6	4271.5	>3000.	310.
1355.	689.7	4271.6	2380.	225.
1354.	689.9	4271.8	1540.	0.
1354.	690.2	4272.0	2380.	220.
1353.	690.5	4272.2	>3000.	310.
1353.	690.8	4272.4	2018.	325.
1352.	690.9	4272.4	1710.	450.
1352.	691.0	4272.4	894.	680.
1351.	691.1	4272.4	2130.	280.
1350.	691.3	4272.5	>3000.	425.
1350.	691.3	4272.3	2018.	640.
1349.	691.3	4272.2	1150.	300.
1348.	691.3	4272.0	415.	250.
1348.	691.3	4271.9	680.	260.
1347.	691.5	4271.7	582.	490.
1347.	691.8	4271.6	415.	520.
1347.	692.0	4271.4	151.	650.
1347.	692.2	4271.2	75.	660.
1346.	692.2	4270.9	113.	770.
1346.	692.2	4270.5	75.	315.
1345.	692.1	4270.2	339.	450.
1344.	692.1	4269.8	38.	105.
1343.	692.1	4269.8	38.	70.
1342.	692.1	4269.7	0.	0.
1342.	692.1	4269.7	0.	60.
1341.	692.1	4269.6	0.	0.

1 AUG 74 EVENT 15.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1517.	693.7	4280.2	498.	150.
1516.	693.8	4279.5	468.	5.
1516.	693.9	4279.1	845.	100.
1514.	693.3	4277.9	794.	65.
1513.	692.8	4277.0	711.	165.
1512.	692.8	4276.5	794.	95.
1511.	692.2	4275.4	332.	85.
1511.	691.8	4274.7	91.	0.
1510.	691.6	4274.2	60.	0.
1510.	691.0	4273.4	106.	80.
1509.	690.1	4272.8	257.	150.
1508.	689.9	4272.9	257.	105.
1508.	689.6	4272.8	408.	150.
1508.	688.5	4272.7	1303.	220.
1507.	688.2	4272.5	1160.	275.
1507.	687.4	4272.5	1843.	490.
1507.	687.0	4272.7	798.	355.
1506.	686.3	4272.3	798.	160.
1506.	686.1	4272.4	60.	0.
1506.	685.7	4272.3	15.	0.
1504.	684.8	4272.3	0.	0.
1503.	684.4	4272.2	0.	0.
1503.	684.2	4272.2	0.	0.
1502.	683.5	4272.1	0.	0.
1501.	683.2	4272.2	0.	0.
1501.	683.0	4272.5	0.	0.

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        1   AUG  74   EVENT  16.01


TIME      X         Y        S02-TB   S02-GL
(CDT)   (KM)      (KM)      (PPM-M)   (PPB)


1517.   693.7    4280.2     498.      150.
1518.   693.0    4280.0     332.      150.
1519.   692.6    4280.0     533.      175.
1520.   691.9    4279.6     629.      225.
1520.   691.4    4279.4     377.      250.
1521.   691.0    4279.0     513.      315.
1522.   689.9    4278.6     347.      225.
1522.   689.8    4278.6      91.        0.
1523.   689.6    4278.5      15.        0.
1524.   688.4    4278.5       0.        0.
1525.   688.0    4279.1       0.        0.
```

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              2   AUG  74   EVENT   3.01


          TIME      X         Y       SO2-TB   SO2-GL
          (CDT)   (KM)      (KM)     (PPM-M)   (PPB)


          1121.   748.9    4286.0       0.        0.
          1121.   748.7    4285.9       8.        0.
          1120.   748.5    4285.7     122.        0.
          1120.   748.3    4285.6      30.        0.
          1120.   748.2    4285.5      76.        0.
          1120.   748.2    4285.3       0.        0.
          1119.   748.2    4285.1       8.        0.
          1118.   748.2    4284.9       8.        0.
          1118.   748.2    4284.8      15.        0.
          1117.   748.2    4284.6       8.        0.
          1117.   748.2    4284.5       0.        0.
          1117.   748.2    4284.4       0.        0.
          1117.   748.2    4284.3       0.        0.
          1116.   748.3    4284.2       0.        0.
          1116.   748.3    4284.1       0.        0.
          1116.   748.3    4284.0       0.        0.
          1116.   748.4    4283.9       0.        0.
          1116.   748.4    4283.8       0.        0.
          1116.   748.4    4283.7       0.        0.
          1116.   748.4    4283.6       0.        0.
          1116.   748.5    4283.5       0.        0.
          1116.   748.5    4283.4       0.        0.
          1115.   748.6    4283.2       0.        0.
          1115.   748.6    4283.1       0.        0.
          1115.   748.7    4283.0       0.        0.
```

2 AUG 74 EVENT 3.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1129.	754.9	4293.5	0.	0.
1129.	754.6	4292.7	0.	0.
1128.	754.6	4291.6	0.	0.
1127.	754.6	4290.6	15.	0.
1127.	754.7	4289.8	0.	0.
1126.	754.7	4289.5	0.	0.

2 AUG 74 EVENT 3.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1126.	754.7	4289.4	0.	0.
1126.	754.0	4289.0	0.	0.
1125.	752.7	4288.1	0.	0.
1125.	751.8	4287.5	0.	0.
1124.	751.2	4287.3	0.	0.
1124.	750.3	4286.9	0.	0.
1124.	750.0	4286.7	0.	0.
1123.	749.1	4286.2	0.	0.
1123.	748.9	4286.0	0.	0.

```
2   AUG  74   EVENT   3.03


TIME      X         Y        SO2-TB    SO2-GL
(CDT)    (KM)      (KM)     (PPM-M)    (PPB)


1131.   750.8    4294.3       0.         0.
1133.   750.0    4294.3       0.         0.
1135.   749.0    4294.3       0.         0.
1135.   747.9    4294.1      30.         0.
1136.   747.3    4293.7       0.         0.
1136.   746.3    4294.0       0.         0.
1136.   745.4    4294.3       0.         0.
```

2 AUG 74 EVENT 3.04

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1141.	745.4	4294.3	0.	0.
1141.	745.2	4294.3	23.	0.
1141.	745.0	4294.3	30.	0.
1142.	744.1	4294.3	0.	0.
1142.	743.3	4294.3	8.	0.
1143.	743.0	4294.3	15.	0.
1143.	742.8	4294.3	30.	0.
1143.	742.3	4294.4	8.	0.
1143.	741.7	4294.5	46.	0.
1144.	741.0	4294.5	0.	0.
1145.	740.2	4294.5	0.	0.
1146.	739.2	4294.5	8.	0.
1146.	738.2	4294.5	8.	0.
1146.	737.9	4294.5	23.	0.
1146.	737.6	4294.4	8.	0.
1147.	737.1	4294.5	23.	0.
1147.	736.6	4294.5	30.	0.
1147.	736.0	4294.5	30.	0.
1148.	735.4	4294.5	46.	0.
1149.	734.8	4294.6	30.	0.
1149.	734.2	4294.7	76.	0.
1149.	733.8	4294.7	76.	0.
1150.	733.4	4294.7	91.	0.
1150.	732.6	4294.7	84.	0.
1151.	731.8	4294.8	84.	0.
1151.	731.4	4294.9	99.	0.
1151.	731.1	4294.9	99.	0.
1151.	730.4	4295.0	106.	0.
1152.	729.7	4295.0	106.	0.
1153.	729.0	4295.1	122.	0.
1153.	728.3	4295.2	144.	0.
1154.	727.7	4295.1	190.	0.
1154.	727.1	4294.9	190.	0.
1154.	726.6	4294.6	160.	0.
1154.	726.1	4294.4	182.	0.
1155.	726.0	4294.3	152.	0.
1155.	725.8	4294.2	175.	0.
1155.	725.5	4294.0	122.	0.
1155.	725.2	4293.8	152.	0.
1155.	724.6	4293.6	175.	0.
1156.	724.1	4293.3	122.	0.
1156.	723.6	4293.0	122.	0.
1156.	723.1	4292.6	144.	0.
1157.	722.9	4292.2	205.	0.
1158.	722.7	4291.8	[illegible]22.	0.
1158.	721.9	4292.2	175.	0.
1159.	721.2	4292.7	144.	0.
1159.	720.6	4293.0	160.	0.
1200.	720.0	4293.3	198.	0.
1200.	719.7	4293.5	144.	0.
1201.	719.3	4293.7	205.	0.

2 AUG 74 EVENT 3.04

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1201.	719.0	4293.9	152.	0.
1201.	718.7	4294.1	167.	0.
1201.	718.4	4294.2	84.	0.
1202.	718.1	4294.3	106.	0.
1202.	717.2	4294.5	122.	0.
1203.	716.3	4294.8	160.	0.
1204.	715.4	4295.3	122.	0.
1204.	714.4	4295.8	38.	0.
1205.	713.7	4295.9	23.	0.
1205.	713.0	4296.1	8.	0.
1206.	712.3	4296.3	15.	0.
1206.	711.6	4296.5	0.	0.

2 AUG 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1319.	755.0	4293.5	30.	0.
1318.	753.2	4293.6	30.	0.
1318.	752.3	4293.8	15.	0.
1317.	750.8	4294.3	15.	0.
1316.	750.0	4294.3	60.	0.
1315.	749.0	4294.3	30.	0.
1314.	747.9	4294.1	15.	0.
1313.	747.3	4293.7	0.	0.
1312.	746.3	4294.0	0.	0.
1312.	745.4	4294.3	0.	0.
1311.	745.0	4294.3	0.	0.
1310.	743.3	4294.3	0.	0.
1309.	742.8	4294.3	0.	0.
1308.	741.7	4294.5	0.	0.
1307.	740.2	4294.5	0.	0.
1307.	738.2	4294.5	0.	0.
1306.	737.6	4294.4	15.	0.
1305.	736.6	4294.5	0.	0.
1305.	735.4	4294.5	0.	0.
1304.	734.2	4294.7	0.	0.
1303.	733.4	4294.7	0.	0.
1303.	731.8	4294.8	30.	0.
1301.	731.1	4294.9	0.	0.
1300.	729.7	4295.0	15.	0.
1259.	728.3	4295.2	0.	0.
1259.	727.1	4294.9	15.	0.
1258.	726.1	4294.4	15.	0.
1258.	725.8	4294.2	15.	0.
1257.	725.2	4293.8	0.	0.
1257.	724.1	4293.3	0.	0.
1255.	723.1	4292.6	0.	0.
1254.	722.7	4291.8	15.	0.
1253.	721.2	4292.7	15.	0.
1253.	720.0	4293.3	0.	0.
1252.	719.3	4293.7	30.	0.
1251.	718.7	4294.1	30.	0.
1250.	718.1	4294.3	15.	0.
1249.	716.3	4294.8	0.	0.
1248.	714.4	4295.8	0.	0.
1247.	713.0	4296.1	0.	0.

2 AUG 74 EVENT 5.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1331.	754.9	4293.5	30.	0.
1332.	754.6	4292.7	15.	0.
1333.	754.6	4291.6	30.	0.
1334.	754.6	4290.6	15.	0.
1336.	754.7	4289.8	0.	0.
1336.	754.7	4289.5	15.	0.
1337.	754.8	4288.7	15.	0.
1337.	755.0	4288.0	45.	0.
1338.	755.1	4287.5	30.	0.
1338.	755.2	4286.5	15.	0.
1339.	755.2	4285.9	0.	0.
1339.	755.1	4285.5	15.	0.
1340.	754.1	4284.1	15.	0.
1341.	753.8	4283.9	0.	0.
1342.	753.1	4283.3	0.	0.
1342.	753.0	4283.0	30.	0.

```
        2   AUG  74   EVENT   5,02


   TIME       X         Y       SO2-TB   SO2-GL
   (CDT)    (KM)      (KM)     (PPM-M)   (PPB)


   1342.   752.9    4282.9      30.        0.
   1343.   751.7    4282.5      30.        0.
   1345.   750.0    4280.9      60.        0.
   1346.   749.5    4280.5      30.        0.
   1346.   749.0    4279.7      15.        0.
   1347.   748.4    4279.5      60.        0.
   1347.   747.0    4278.7      15.        0.
   1348.   746.7    4277.7      45.        0.
   1348.   746.3    4277.5       0.        0.
   1349.   745.6    4277.7      15.        0.
   1351.   743.1    4278.4       0.        0.
   1352.   741.8    4278.8      15.        0.
   1353.   740.7    4279.0       0.        0.
   1354.   740.1    4279.0       0.        0.
   1355.   738.9    4278.8      15.        0.
   1355.   738.1    4278.6       0.        0.
   1355.   737.5    4278.6       0.        0.
   1356.   736.5    4278.8       0.        0.
   1356.   735.7    4279.0      15.        0.
   1357.   734.3    4278.4       0.        0.
   1357.   733.3    4278.5       0.        0.
```

3 AUG 74 EVENT 3.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
849.	754.4	4305.5	0.	0.
848.	754.0	4305.4	15.	120.
848.	753.7	4305.2	166.	70.
847.	753.7	4304.6	136.	95.
846.	753.7	4304.1	287.	80.
845.	753.8	4303.5	75.	595.
845.	753.8	4302.9	287.	0.
845.	754.1	4302.4	166.	0.
844.	754.4	4301.9	257.	0.
844.	754.6	4301.6	468.	0.
844.	754.7	4301.3	302.	0.
844.	754.7	4300.9	106.	0.
843.	754.7	4300.4	211.	0.
843.	754.7	4300.0	30.	0.
842.	754.8	4299.5	15.	0.
842.	754.8	4299.1	45.	45.
842.	754.8	4298.7	75.	80.
841.	754.8	4298.3	106.	90.
841.	754.8	4297.9	166.	110.
841.	754.8	4297.4	287.	175.
840.	754.8	4297.0	604.	90.
840.	754.9	4296.4	181.	75.
839.	754.9	4295.8	196.	68.
839.	754.9	4294.9	166.	25.
839.	755.0	4294.0	136.	0.
839.	755.0	4293.8	91.	0.
838.	754.9	4293.5	60.	0.
838.	754.8	4293.1	15.	0.
838.	754.6	4292.7	0.	0.
837.	754.6	4292.1	45.	0.
837.	754.6	4291.6	0.	0.
836.	754.6	4291.1	0.	0.
836.	754.6	4290.6	30.	0.
836.	754.7	4290.2	15.	0.
836.	754.7	4289.8	0.	0.
836.	754.7	4289.6	0.	0.
835.	754.7	4289.5	0.	0.
835.	754.7	4289.1	30.	0.
835.	754.8	4288.7	0.	0.
834.	754.9	4288.4	0.	0.
834.	755.0	4288.0	0.	0.
833.	755.1	4287.8	0.	0.
833.	755.1	4287.5	0.	0.
833.	755.2	4287.0	0.	0.
833.	755.2	4286.5	0.	0.
832.	755.2	4286.2	0.	0.
832.	755.2	4285.9	15.	0.
832.	755.2	4285.7	0.	0.
831.	755.1	4285.5	0.	0.
831.	754.6	4284.8	45.	0.
830.	754.1	4284.1	30.	0.

3 AUG 74 EVENT 5.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
905.	755.3	4306.7	0.	0.
905.	755.3	4306.6	0.	0.
906.	755.3	4306.4	8.	0.
906.	755.3	4306.3	23.	0.
907.	755.0	4306.0	0.	0.
907.	754.7	4305.8	23.	0.
907.	754.4	4305.5	0.	0.
908.	754.1	4305.4	46.	0.
908.	753.9	4305.3	38.	0.
908.	753.7	4305.2	30.	35.
909.	753.7	4304.8	30.	0.
909.	753.7	4304.5	84.	0.
910.	753.7	4304.1	266.	60.
910.	753.7	4303.7	205.	90.
910.	753.8	4303.3	122.	290.
911.	753.8	4302.9	167.	120.
911.	754.0	4302.6	122.	50.
911.	754.2	4302.2	334.	160.
912.	754.4	4301.9	479.	100.
912.	754.5	4301.7	433.	1120.
912.	754.6	4301.5	380.	240.
912.	754.7	4301.3	236.	180.
913.	754.7	4301.0	274.	145.
913.	754.7	4300.7	220.	120.
913.	754.7	4300.4	76.	110.
913.	754.7	4300.1	68.	95.
913.	754.8	4299.8	152.	105.
914.	754.8	4299.5	114.	105.
914.	754.8	4299.2	106.	115.
914.	754.8	4299.0	99.	105.
914.	754.8	4298.7	91.	92.
914.	754.8	4298.4	68.	75.
915.	754.8	4298.2	76.	70.
915.	754.8	4297.9	61.	70.
915.	754.8	4297.6	38.	72.
915.	754.8	4297.3	68.	45.
915.	754.8	4297.0	175.	20.
916.	754.9	4296.6	61.	55.
916.	754.9	4296.2	182.	30.
916.	754.9	4295.8	167.	12.
917.	754.9	4295.2	38.	0.
917.	754.9	4294.6	182.	0.
918.	755.0	4294.0	0.	0.

3 AUG 74 EVENT 5.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
919.	755.0	4294.0	0.	0.
919.	754.9	4293.5	0.	0.
920.	754.6	4292.7	8.	0.
921.	754.6	4291.6	0.	0.
921.	754.6	4290.6	0.	0.
922.	754.7	4289.8	0.	0.
922.	754.7	4289.5	0.	0.
923.	754.8	4288.7	0.	0.
924.	755.0	4288.0	0.	0.
925.	755.1	4287.5	15.	0.
925.	755.2	4286.5	0.	0.
926.	755.2	4285.9	0.	0.
926.	755.1	4285.5	0.	0.
927.	754.1	4284.1	0.	0.
928.	753.8	4283.9	0.	0.
929.	753.1	4283.3	0.	0.
929.	753.0	4283.0	0.	0.
930.	752.8	4282.3	0.	0.
931.	753.0	4280.7	0.	0.
933.	753.0	4280.0	23.	0.
934.	753.0	4279.5	46.	0.
934.	753.0	4279.3	99.	0.
935.	753.0	4278.6	38.	0.
936.	753.0	4278.3	38.	0.
936.	753.1	4277.7	15.	0.
937.	753.1	4277.0	38.	0.
938.	753.1	4276.3	15.	0.
939.	753.2	4275.8	0.	0.
939.	753.4	4275.6	23.	0.
940.	753.9	4274.8	23.	0.
940.	754.1	4274.1	30.	0.
941.	754.6	4273.7	30.	0.
941.	754.0	4273.3	38.	0.
942.	753.6	4272.8	46.	0.
942.	753.3	4272.3	38.	0.
943.	752.6	4271.5	8.	0.
944.	752.3	4271.8	0.	0.
945.	751.7	4271.1	15.	0.
946.	752.2	4270.5	8.	0.
946.	752.5	4270.3	15.	0.
947.	752.6	4269.1	0.	0.
947.	752.3	4268.8	30.	0.
948.	752.0	4268.4	30.	0.
948.	752.1	4268.0	15.	0.
948.	752.2	4267.5	8.	0.
949.	752.7	4266.4	15.	0.
950.	752.8	4265.6	8.	0.
950.	753.0	4264.8	0.	0.
951.	753.5	4264.0	0.	0.
951.	753.5	4263.2	23.	0.
952.	753.6	4261.9	46.	0.

3 AUG 74 EVENT 5.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
953.	753.5	4261.1	23.	0.
953.	753.6	4260.6	23.	0.

3 AUG 74 EVENT 8.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1033.	747.4	4258.3	38.	0.
1036.	749.6	4258.2	0.	0.
1037.	750.5	4258.3	46.	0.
1037.	750.8	4258.6	8.	0.
1038.	751.8	4259.3	38.	0.
1039.	752.9	4260.5	8.	0.
1040.	753.6	4260.6	23.	0.
1041.	754.1	4260.6	0.	0.
1042.	754.6	4261.0	23.	0.
1042.	755.1	4261.1	15.	0.
1043.	755.9	4261.6	30.	0.
1044.	757.1	4262.4	0.	0.
1044.	757.7	4262.8	53.	0.
1045.	758.3	4263.1	8.	0.
1045.	758.8	4263.5	30.	0.
1046.	759.6	4264.4	8.	0.
1047.	759.6	4264.8	23.	0.
1048.	760.3	4264.9	23.	0.
1048.	760.5	4265.1	23.	0.
1048.	760.8	4265.4	0.	0.
1049.	761.3	4265.7	30.	0.
1051.	762.7	4265.4	0.	0.

3 AUG 74 EVENT 8.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1137.	763.3	4300.9	0.	0.
1135.	764.3	4299.7	15.	0.
1133.	764.6	4299.8	0.	0.
1132.	764.7	4299.0	15.	0.
1130.	764.7	4297.2	23.	0.
1129.	764.8	4296.4	8.	0.
1128.	764.4	4295.7	15.	0.
1127.	764.4	4294.8	23.	0.
1126.	764.4	4293.6	8.	0.
1126.	764.4	4292.8	30.	0.
1125.	764.5	4291.6	23.	0.
1124.	764.4	4290.8	30.	0.
1123.	764.5	4289.5	38.	0.
1122.	764.5	4288.9	8.	0.
1122.	764.4	4288.2	30.	0.
1121.	764.2	4287.5	46.	0.
1121.	763.9	4287.3	38.	0.
1120.	763.3	4286.3	30.	0.
1118.	762.2	4284.6	15.	0.
1115.	762.2	4284.1	23.	0.
1114.	762.4	4283.2	38.	0.
1113.	762.0	4282.3	15.	0.
1113.	762.0	4281.9	23.	0.
1112.	762.2	4280.3	30.	0.
1111.	762.3	4278.8	61.	0.
1110.	762.4	4277.4	46.	0.
1109.	762.4	4276.5	46.	0.
1108.	762.4	4276.1	53.	0.
1107.	762.4	4275.4	38.	0.
1106.	762.4	4274.6	46.	0.
1106.	762.4	4274.1	15.	0.
1106.	762.4	4273.8	38.	0.
1104.	762.4	4273.0	30.	0.
1104.	762.5	4272.2	15.	0.
1103.	762.5	4271.3	30.	0.
1103.	762.6	4271.0	8.	0.
1101.	762.7	4269.5	23.	0.
1100.	762.7	4268.9	0.	0.
1100.	762.7	4268.3	0.	0.
1057.	762.7	4267.5	8.	0.
1056.	762.7	4266.6	23.	0.
1056.	762.7	4265.4	0.	0.

3 AUG 74 EVENT 8.03

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1153.	763.1	4318.8	0.	0.
1153.	763.0	4318.3	8.	0.
1152.	762.9	4317.9	8.	0.
1152.	762.8	4317.4	8.	0.
1152.	762.7	4317.1	8.	0.
1152.	762.6	4316.8	8.	0.
1152.	762.6	4316.5	8.	0.
1151.	762.6	4316.3	30.	0.
1151.	762.7	4316.1	53.	0.
1150.	762.7	4315.9	53.	0.
1150.	762.8	4315.5	152.	0.
1149.	762.8	4315.1	160.	48.
1149.	762.8	4314.7	198.	80.
1149.	762.8	4314.5	182.	74.
1149.	762.8	4314.4	160.	63.
1149.	762.8	4314.2	122.	59.
1149.	762.8	4314.0	122.	31.
1148.	762.8	4313.7	114.	0.
1148.	762.8	4313.4	114.	0.
1148.	762.8	4313.2	137.	0.
1148.	762.7	4313.0	76.	0.
1148.	762.7	4312.8	30.	0.
1147.	762.7	4312.5	8.	0.
1147.	762.7	4312.2	38.	0.
1147.	762.7	4311.9	38.	0.
1146.	762.7	4311.5	23.	0.
1146.	762.7	4311.1	23.	0.
1146.	762.8	4310.7	46.	0.
1145.	762.9	4310.3	30.	0.
1145.	762.9	4309.8	30.	0.
1145.	763.0	4309.3	8.	0.
1145.	763.1	4309.3	15.	0.
1144.	763.2	4309.3	30.	0.
1144.	763.3	4309.3	30.	0.
1143.	763.3	4308.5	46.	0.
1143.	763.3	4307.7	129.	42.
1142.	763.4	4306.9	160.	105.
1142.	763.5	4306.8	198.	95.
1142.	763.6	4306.7	205.	86.
1142.	763.7	4306.6	182.	54.
1142.	763.8	4306.4	160.	45.
1142.	763.8	4306.3	114.	27.
1141.	763.8	4306.1	76.	14.
1141.	763.8	4305.9	114.	0.
1141.	763.8	4305.6	68.	0.
1141.	763.8	4305.3	68.	0.
1141.	763.8	4304.7	61.	0.
1140.	763.8	4304.2	15.	0.
1140.	763.8	4303.7	46.	0.
1139.	763.8	4303.4	84.	0.
1139.	763.7	4303.1	38.	0.

3 AUG 74 EVENT 8.03

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1139.	763.7	4302.8	68.	0.
1139.	763.5	4302.5	53.	0.
1139.	763.4	4302.2	91.	0.
1138.	763.2	4301.9	30.	0.
1138.	763.1	4301.7	0.	0.
1138.	763.0	4301.4	8.	0.
1137.	762.9	4301.2	8.	0.
1137.	763.0	4301.1	0.	0.
1137.	763.1	4301.0	0.	0.
1137.	763.3	4300.9	0.	0.

3 AUG 74 EVENT 10.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1226.	763.1	4318.8	0.	0.
1227.	762.9	4318.1	15.	0.
1227.	762.8	4317.4	45.	0.
1228.	762.7	4317.0	68.	0.
1228.	762.6	4316.5	91.	0.
1228.	762.7	4316.2	75.	0.
1229.	762.7	4315.9	106.	0.
1229.	762.8	4315.3	106.	0.
1229.	762.8	4314.7	121.	0.
1230.	762.8	4314.4	174.	0.
1230.	762.8	4314.2	143.	0.
1230.	762.8	4313.8	166.	0.
1230.	762.8	4313.4	113.	28.
1231.	762.7	4313.1	121.	0.
1231.	762.7	4312.8	128.	0.
1231.	762.7	4312.3	113.	0.
1231.	762.7	4311.9	128.	0.
1231.	762.7	4311.3	113.	30.
1232.	762.8	4310.7	53.	0.
1233.	762.9	4310.0	8.	0.
1233.	763.0	4309.3	0.	0.
1233.	763.2	4309.3	15.	0.
1233.	763.3	4309.3	23.	0.
1234.	763.3	4308.1	15.	0.
1235.	763.4	4306.9	91.	0.
1235.	763.5	4306.7	121.	0.
1235.	763.7	4306.6	106.	0.
1236.	763.8	4306.4	91.	0.
1236.	763.8	4306.1	128.	0.
1236.	763.8	4305.7	113.	0.
1236.	763.8	4305.3	159.	0.
1237.	763.8	4304.5	23.	0.
1238.	763.8	4303.7	45.	0.
1238.	763.8	4303.3	53.	0.
1238.	763.7	4302.8	60.	0.
1238.	763.5	4302.4	106.	0.
1239.	763.2	4301.9	38.	0.
1239.	763.0	4301.5	8.	0.
1240.	762.9	4301.2	8.	0.
1240.	763.1	4301.0	0.	0.
1240.	763.3	4300.9	0.	0.
1241.	763.8	4300.3	8.	0.
1242.	764.3	4299.7	0.	0.
1243.	764.4	4299.7	8.	0.
1244.	764.6	4299.8	0.	0.

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        3   AUG  74   EVENT  11.01


         TIME      X         Y        SO2-TB   SO2-GL
        (CDT)    (KM)      (KM)      (PPM-M)   (PPB)


        1259.   777.4    4308.6       53.        0.
        1257.   774.1    4308.6       76.        0.
        1256.   773.6    4308.6       68.        0.
        1255.   772.5    4307.4       99.        0.
        1254.   771.7    4306.1       61.        0.
        1253.   771.0    4305.4       76.        0.
        1252.   769.6    4303.9       91.        0.
        1251.   768.2    4302.4       38.        0.
        1251.   767.8    4302.3       23.        0.
        1250.   766.7    4301.8       15.        0.
        1249.   766.0    4301.6       15.        0.
        1249.   765.5    4301.4       23.        0.
        1248.   765.1    4299.9        0.        0.
        1247.   764.6    4299.8        0.        0.
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3 AUG 74 EVENT 11.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1300.	777.4	4308.6	53.	0.
1301.	777.3	4310.2	15.	0.
1302.	777.2	4311.9	15.	0.
1303.	777.2	4313.4	0.	0.
1303.	777.1	4315.1	76.	0.
1304.	777.2	4315.9	91.	0.
1305.	777.1	4316.7	114.	0.
1305.	777.1	4317.5	122.	0.
1306.	777.1	4318.3	106.	0.
1307.	777.1	4319.3	61.	27.
1308.	776.9	4321.2	8.	0.

3 AUG 74 EVENT 12.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1329.	777.8	4294.6	0.	0.
1329.	777.7	4295.7	0.	0.
1328.	777.6	4297.3	8.	0.
1327.	777.6	4298.1	0.	0.
1327.	777.6	4298.6	0.	0.
1327.	777.6	4299.0	0.	0.
1326.	777.5	4300.0	0.	0.
1326.	777.5	4301.0	0.	0.
1326.	777.5	4301.4	0.	0.
1325.	777.5	4302.1	0.	0.
1324.	777.4	4303.8	15.	0.
1324.	777.4	4304.6	30.	0.
1323.	777.4	4305.5	46.	0.
1322.	777.4	4306.7	46.	0.
1321.	777.4	4307.8	61.	0.
1321.	777.4	4308.6	76.	0.
1320.	777.3	4310.2	38.	0.
1319.	777.2	4311.9	8.	0.
1318.	777.2	4313.4	8.	0.
1316.	777.1	4315.1	23.	0.
1316.	777.2	4315.9	53.	0.
1315.	777.1	4316.7	61.	0.
1315.	777.1	4317.5	68.	0.
1314.	777.1	4318.3	99.	0.
1312.	777.1	4319.3	68.	0.
1311.	776.9	4321.2	8.	0.

3 AUG 74 EVENT 13.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1340.	788.6	4297.7	0.	0.
1339.	786.6	4297.6	8.	0.
1338.	785.6	4297.5	8.	0.
1338.	784.4	4297.4	0.	0.
1337.	783.3	4297.1	0.	0.
1337.	782.7	4296.4	0.	0.
1336.	781.8	4295.6	0.	0.
1336.	780.9	4295.2	0.	0.
1335.	779.7	4295.0	0.	0.
1334.	778.5	4294.7	15.	0.
1334.	777.8	4294.6	15.	0.

3 AUG 74 EVENT 14.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1351.	788.6	4297.6	0.	0.
1352.	788.5	4298.8	15.	0.
1352.	788.5	4299.2	8.	0.
1353.	788.5	4299.9	8.	0.
1354.	789.3	4301.0	0.	0.
1355.	789.0	4301.7	8.	0.
1355.	788.8	4302.5	0.	0.
1356.	788.8	4303.6	38.	0.
1357.	788.7	4305.7	15.	0.
1358.	788.6	4307.3	23.	0.
1359.	788.6	4308.9	38.	0.

3 AUG 74 EVENT 16.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1426.	788.6	4308.9	38.	0.
1426.	789.4	4309.0	68.	0.
1427.	790.2	4309.0	91.	0.
1427.	791.4	4309.1	53.	0.
1428.	792.6	4309.2	61.	0.
1428.	793.6	4309.2	30.	0.
1429.	794.6	4309.3	46.	0.
1430.	795.6	4309.3	15.	0.
1431.	796.7	4309.3	30.	0.
1432.	797.7	4309.3	38.	0.
1433.	798.7	4309.3	46.	0.
1433.	799.5	4309.3	38.	0.
1433.	800.3	4309.3	23.	0.
1434.	801.3	4309.3	38.	0.
1435.	802.3	4309.2	46.	0.
1435.	802.8	4309.3	38.	0.
1435.	803.2	4309.3	30.	0.
1436.	803.7	4309.7	53.	0.
1436.	804.1	4310.1	23.	0.
1437.	805.3	4310.1	38.	0.
1439.	806.5	4310.1	30.	0.
1439.	806.9	4310.3	30.	0.
1440.	807.3	4310.6	23.	0.
1440.	807.8	4310.6	23.	0.
1441.	808.4	4310.7	30.	0.

3 AUG 74 EVENT 17.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1517.	816.9	4269.3	38.	0.
1516.	816.9	4270.1	46.	0.
1515.	816.8	4270.6	38.	0.
1515.	816.9	4271.0	46.	0.
1514.	816.8	4271.9	30.	0.
1514.	816.8	4272.9	53.	0.
1513.	816.7	4273.7	84.	0.
1513.	816.3	4274.1	68.	0.
1512.	815.9	4274.5	68.	0.
1512.	815.3	4275.0	76.	0.
1511.	815.1	4275.7	84.	0.
1511.	815.0	4276.5	91.	0.
1511.	815.0	4277.4	99.	0.
1508.	815.0	4279.0	91.	0.
1506.	814.9	4280.6	91.	0.
1505.	814.9	4282.2	84.	0.
1504.	814.9	4283.8	76.	0.
1504.	814.9	4284.6	68.	0.
1503.	814.8	4285.4	53.	0.
1503.	814.8	4285.8	38.	0.
1502.	814.8	4287.1	30.	0.
1501.	814.7	4288.7	38.	0.
1500.	814.7	4290.3	30.	0.
1459.	814.7	4291.9	15.	0.
1458.	814.6	4293.5	30.	0.
1457.	814.6	4294.3	23.	0.
1457.	814.5	4294.8	23.	0.
1457.	814.5	4295.5	23.	0.
1456.	814.5	4296.3	23.	0.
1456.	814.5	4296.7	15.	0.
1455.	814.4	4298.3	0.	0.
1454.	814.4	4299.6	23.	0.
1454.	814.4	4300.3	8.	0.
1453.	814.4	4301.6	8.	0.
1452.	814.4	4302.3	15.	0.
1451.	814.4	4303.9	0.	0.
1450.	814.3	4304.8	8.	0.
1449.	814.3	4306.5	15.	0.
1448.	813.0	4307.8	8.	0.
1448.	812.7	4308.3	23.	0.
1447.	812.6	4308.7	15.	0.
1447.	812.5	4309.5	15.	0.
1444.	810.6	4309.5	30.	0.
1443.	810.6	4310.1	23.	0.
1443.	810.2	4310.2	46.	0.
1442.	810.1	4310.7	30.	0.

3 AUG 74 EVENT 18.01

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 TIME      X          Y        SO2-TB   SO2-GL
(CDT)    (KM)       (KM)      (PPM-M)   (PPB)


1520.   816.9     4268.9       38.       0.
1520.   816.9     4269.3       38.       0.
1520.   816.9     4270.1       46.       0.
1521.   816.8     4270.6       30.       0.
1521.   816.9     4271.0       38.       0.
1522.   816.8     4271.9       46.       0.
1522.   816.8     4272.9       61.       0.
1523.   816.7     4273.7       61.       0.
1523.   816.3     4274.1       53.       0.
1524.   815.9     4274.5       53.       0.
1524.   815.3     4275.0       46.       0.
1524.   815.1     4275.7       61.       0.
1525.   815.0     4276.5       84.       0.
1525.   815.0     4277.4       76.       0.
1527.   815.0     4279.0       46.       0.
1528.   814.9     4280.6       61.       0.
1529.   814.9     4282.2       61.       0.
1530.   814.9     4283.8       30.       0.
1531.   814.9     4284.6       53.       0.
1531.   814.8     4285.4       46.       0.
1531.   814.8     4285.8       53.       0.
1532.   814.8     4287.1       30.       0.
1533.   814.7     4288.7       38.       0.
1534.   814.7     4290.3       46.       0.
1535.   814.7     4291.9       15.       0.
1536.   814.6     4293.5        8.       0.
1536.   814.6     4294.3       15.       0.
1537.   814.5     4294.8        0.       0.
1537.   814.5     4295.5        8.       0.
1537.   814.5     4296.3        8.       0.
1537.   814.5     4296.7       15.       0.
1539.   814.4     4298.3        0.       0.
1540.   814.4     4299.6        0.       0.
1540.   814.4     4300.3        0.       0.
1541.   814.4     4301.6       23.       0.
1541.   814.4     4302.3        8.       0.
1542.   814.4     4303.9        8.       0.
1543.   814.3     4304.8       15.       0.
1545.   814.3     4306.5        0.       0.
1546.   813.0     4307.8       46.       0.
1546.   812.7     4308.3       23.       0.
1547.   812.6     4308.7        8.       0.
1548.   812.5     4309.5       30.       0.
1550.   810.6     4309.5       30.       0.
1599.   810.6     4310.1       68.       0.
1600.   810.2     4310.2       61.       0.
1601.   810.1     4310.7       53.       0.
1602.   808.4     4310.7       46.       0.
1603.   808.3     4311.9       46.       0.
1604.   808.3     4312.7       38.       0.
1604.   808.1     4313.5       38.       0.
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3 AUG 74 EVENT 18.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1605.	807.5	4314.3	46.	0.
1605.	807.2	4315.1	46.	0.
1606.	806.7	4315.9	53.	0.
1606.	806.3	4316.6	76.	0.
1607.	805.8	4316.6	53.	0.
1607.	805.4	4317.0	68.	0.
1608.	805.4	4318.2	53.	0.
1609.	805.3	4319.8	38.	0.
1609.	805.3	4320.6	23.	0.
1610.	805.1	4321.7	23.	0.
1610.	805.1	4322.5	30.	0.
1611.	805.0	4323.3	15.	0.
1612.	805.0	4324.9	30.	0.
1613.	804.9	4325.5	23.	0.
1613.	804.9	4326.2	38.	0.
1614.	804.7	4326.6	8.	0.
1614.	803.8	4327.6	15.	0.
1615.	803.6	4329.3	8.	0.
1616.	803.6	4330.1	15.	0.
1617.	803.6	4331.4	15.	0.
1618.	803.5	4332.9	15.	0.
1618.	803.5	4334.0	8.	0.
1619.	803.5	4334.5	15.	0.
1619.	803.5	4335.5	0.	0.
1620.	803.6	4336.2	15.	0.
1620.	803.5	4336.9	15.	0.
1621.	803.2	4337.7	8.	0.
1622.	802.9	4338.6	8.	0.
1622.	802.8	4339.0	0.	0.
1624.	802.7	4339.7	15.	0.

3 AUG 74 EVENT 19.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1626.	802.7	4339.7	15.	0.
1627.	801.6	4340.1	15.	0.
1628.	800.5	4340.8	0.	0.
1628.	799.6	4340.9	0.	0.
1629.	798.5	4340.8	8.	0.
1629.	798.0	4340.8	0.	0.
1630.	796.4	4340.7	0.	0.
1631.	796.1	4340.8	0.	0.
1631.	795.6	4340.8	15.	0.
1631.	795.3	4340.7	15.	0.
1632.	794.6	4340.7	0.	0.
1632.	793.9	4340.7	0.	0.
1633.	792.8	4340.6	0.	0.
1633.	792.4	4340.8	0.	0.
1634.	792.0	4340.8	0.	0.
1634.	791.0	4341.0	0.	0.
1635.	790.2	4341.0	8.	0.
1636.	789.0	4340.9	0.	0.
1637.	788.7	4340.9	8.	0.
1638.	788.1	4340.9	38.	0.
1640.	787.3	4340.6	0.	0.
1641.	786.8	4340.6	15.	0.
1641.	786.4	4340.6	23.	0.
1642.	785.1	4340.6	8.	0.
1643.	783.1	4340.5	0.	0.
1644.	781.7	4340.4	23.	0.
1645.	781.2	4340.0	0.	0.
1646.	780.4	4339.4	8.	0.
1647.	779.2	4338.4	0.	0.
1648.	777.7	4337.1	8.	0.
1649.	776.5	4336.2	23.	0.
1650.	775.7	4335.8	15.	0.
1651.	775.1	4335.2	15.	0.
1652.	774.2	4335.2	8.	0.
1652.	772.5	4335.1	23.	0.
1653.	771.4	4335.1	0.	0.
1653.	771.0	4335.0	0.	0.
1653.	770.6	4335.0	0.	0.
1654.	769.4	4335.0	0.	0.
1655.	767.8	4334.9	0.	0.
1656.	766.2	4334.9	15.	0.
165[illegible].	764.7	4334.9	15.	0.
1659.	764.0	4334.8	0.	0.
1700.	763.8	4333.3	0.	0.

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            3   AUG   74   EVENT  20.01


  TIME       X          Y          SO2-TB    SO2-GL
  (CDT)     (KM)       (KM)       (PPM-M)    (PPB)


  1700.    763.8      4333.3        0.         0.
  1700.    763.9      4332.8        0.         0.
  1700.    763.9      4332.4        0.         0.
  1701.    763.9      4332.0        0.         0.
  1701.    763.9      4331.6        0.         0.
  1701.    763.9      4331.3        0.         0.
  1701.    763.9      4330.9        0.         0.
  1702.    763.9      4330.1        0.         0.
  1703.    764.0      4329.3        0.         0.
  1703.    764.0      4328.9       30.         0.
  1703.    764.0      4328.5        0.         0.
  1704.    764.0      4327.7       38.         0.
  1704.    764.0      4327.0        0.         0.
  1704.    764.0      4326.5        0.         0.
  1705.    764.0      4326.1        0.         0.
  1705.    764.0      4325.7        8.         0.
  1705.    764.0      4325.3        0.         0.
  1706.    764.0      4324.9        0.         0.
  1706.    764.1      4324.5        0.         0.
  1707.    764.2      4324.3        0.         0.
  1707.    764.4      4324.2        0.         0.
  1707.    764.4      4324.1        8.         0.
  1707.    764.5      4324.0       15.         0.
  1708.    764.3      4323.4        0.         0.
  1708.    764.2      4322.9       38.         0.
  1709.    763.9      4322.1       30.         0.
  1709.    763.7      4321.3       46.         0.
  1710.    763.6      4320.6       15.         0.
  1710.    763.4      4320.0       38.         0.
  1710.    763.2      4319.4       15.         0.
  1711.    763.1      4318.8        0.         0.
  1711.    762.9      4318.1        8.         0.
  1712.    762.8      4317.4       15.         0.
  1712.    762.7      4317.0       15.         0.
  1712.    762.6      4316.5        0.         0.
  1712.    762.7      4316.2        8.         0.
  1713.    762.7      4315.9       15.         0.
  1713.    762.8      4315.3       30.         0.
  1713.    762.8      4314.7       53.         0.
  1713.    762.8      4314.5       68.         0.
  1714.    762.8      4314.2       84.         0.
  1714.    762.8      4313.8       68.         0.
  1714.    762.8      4313.4       53.         0.
  1714.    762.7      4313.1       68.         0.
  1715.    762.7      4312.8       76.         0.
  1715.    762.7      4312.3       91.         0.
  1715.    762.7      4311.9      114.         0.
  1716.    762.7      4311.3       91.         0.
  1716.    762.8      4310.7       53.         0.
  1716.    762.9      4310.0       61.         0.
  1717.    763.0      4309.3       46.         0.
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3 AUG 74 EVENT 20.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1717.	763.2	4309.3	46.	0.
1717.	763.3	4309.3	46.	0.
1718.	763.3	4308.1	91.	0.
1719.	763.4	4306.9	30.	0.
1719.	763.5	4306.7	30.	0.
1720.	763.7	4306.6	30.	0.
1720.	763.8	4306.4	38.	0.
1720.	763.8	4306.1	46.	0.
1720.	763.8	4305.7	38.	0.
1720.	763.8	4305.3	8.	0.
1721.	763.8	4304.5	152.	51.
1722.	763.8	4303.7	76.	20.
1722.	763.8	4303.3	30.	0.
1722.	763.7	4302.8	38.	0.
1723.	763.5	4302.4	91.	0.
1723.	763.2	4301.9	160.	0.
1723.	763.0	4301.5	84.	0.
1724.	762.9	4301.2	122.	0.
1724.	763.1	4301.0	68.	38.
1725.	763.3	4300.9	30.	32.
1725.	763.8	4300.3	46.	0.
1726.	764.3	4299.7	53.	0.
1727.	764.4	4299.7	53.	32.
1727.	764.6	4299.8	61.	0.
1728.	764.6	4299.4	46.	0.
1728.	764.7	4299.0	38.	0.
1730.	764.7	4298.1	0.	0.
1731.	764.7	4297.2	30.	0.
1731.	764.7	4296.8	23.	0.
1731.	764.8	4296.4	8.	0.
1731.	764.6	4296.1	30.	0.
1732.	764.4	4295.7	15.	0.
1732.	764.4	4295.3	8.	0.
1732.	764.4	4294.8	0.	0.
1733.	764.4	4294.2	8.	0.
1733.	764.4	4293.6	0.	0.

3 AUG 74 EVENT 21.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TB (PPM-M)	SO2-GL (PPB)
1734.	764.4	4293.6	0.	0.
1735.	763.5	4293.7	0.	0.
1735.	762.9	4293.6	0.	0.
1736.	762.3	4293.6	0.	0.
1739.	760.0	4293.5	0.	0.
1740.	758.4	4293.6	0.	0.
1741.	756.8	4293.5	0.	0.
1742.	755.0	4293.5	0.	0.

3 AUG 74 EVENT 22.01

TIME (CDT)	X (KM)	Y (KM)	SO2-TH (PPM-M)	SO2-GL (PPB)
1748.	754.7	4301.3	0.	0.
1747.	754.7	4300.4	0.	0.
1747.	754.8	4299.5	0.	0.
1746.	754.8	4298.7	0.	0.
1746.	754.8	4297.9	0.	0.
1745.	754.8	4297.0	0.	0.
1744.	754.9	4295.8	0.	0.
1743.	755.0	4294.0	0.	0.
1742.	754.9	4293.5	0.	0.

3 AUG 74 EVENT 22.02

TIME (CDT)	X (KM)	Y (KM)	SO2-TR (PPM-M)	SO2-GL (PPB)
1756.	755.3	4309.4	75.	0.
1756.	755.3	4309.1	181.	0.
1756.	755.3	4308.8	91.	0.
1755.	755.3	4308.6	151.	0.
1755.	755.3	4308.3	15.	0.
1755.	755.3	4308.0	60.	20.
1755.	755.3	4307.7	106.	30.
1754.	755.3	4307.5	75.	20.
1754.	755.3	4307.2	166.	0.
1754.	755.3	4307.0	106.	10.
1754.	755.3	4306.7	106.	20.
1754.	755.3	4306.6	91.	30.
1754.	755.3	4306.5	75.	40.
1753.	755.3	4306.4	75.	70.
1753.	755.3	4306.3	60.	90.
1753.	755.3	4306.3	45.	110.
1754.	755.2	4306.1	0.	200.
1753.	755.0	4306.0	211.	290.
1753.	754.8	4305.8	151.	390.
1752.	754.6	4305.7	181.	330.
1752.	754.4	4305.5	136.	220.
1752.	754.2	4305.5	45.	280.
1752.	754.1	4305.4	151.	380.
1752.	754.0	4305.4	196.	450.
1752.	753.8	4305.3	257.	370.
1752.	753.7	4305.2	302.	170.
1751.	753.7	4305.0	226.	110.
1751.	753.7	4304.8	347.	70.
1751.	753.7	4304.5	121.	30.
1751.	753.7	4304.3	0.	0.
1750.	753.7	4304.1	106.	0.
1750.	753.7	4303.8	0.	0.
1750.	753.7	4303.6	0.	40.
1750.	753.8	4303.4	0.	90.
1750.	753.8	4303.1	0.	140.
1750.	753.8	4302.9	15.	190.
1749.	753.9	4302.7	106.	160.
1749.	754.0	4302.5	0.	480.
1749.	754.2	4302.3	181.	940.
1749.	754.3	4302.1	0.	430.
1748.	754.4	4301.9	106.	0.
1748.	754.5	4301.8	302.	0.
1748.	754.5	4301.6	0.	0.
1748.	754.6	4301.5	0.	0.
1748.	754.6	4301.4	0.	0.
1748.	754.7	4301.3	0.	0.